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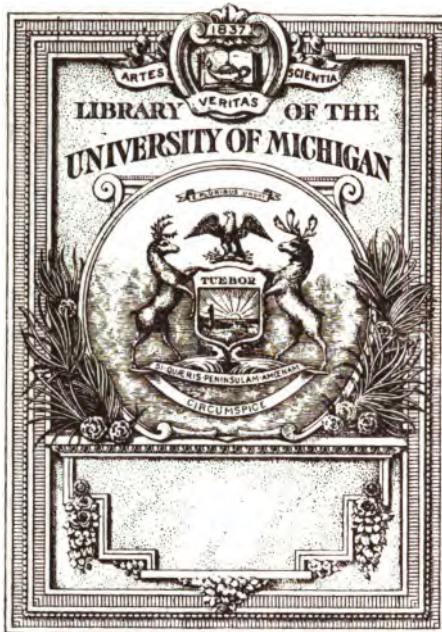
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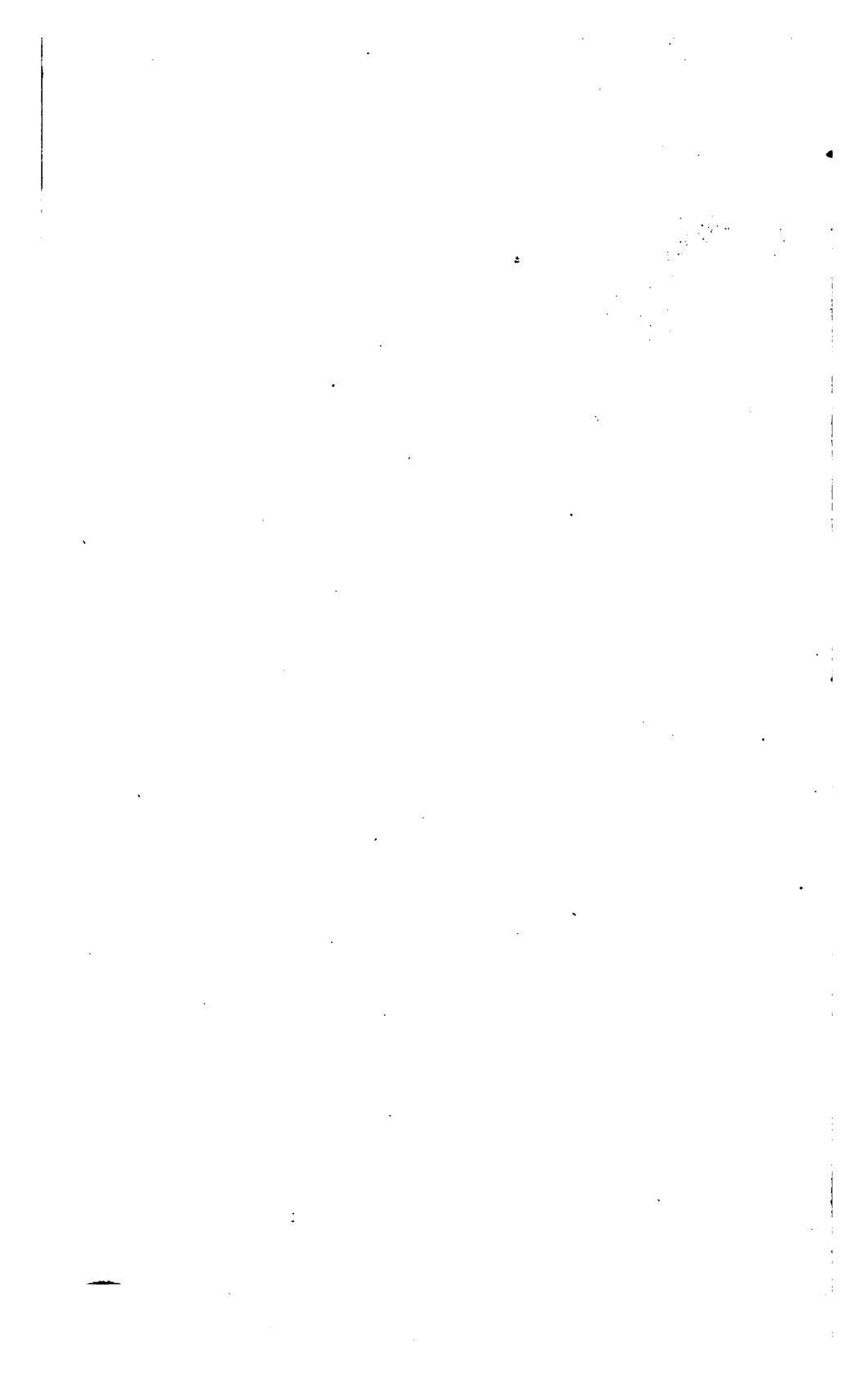
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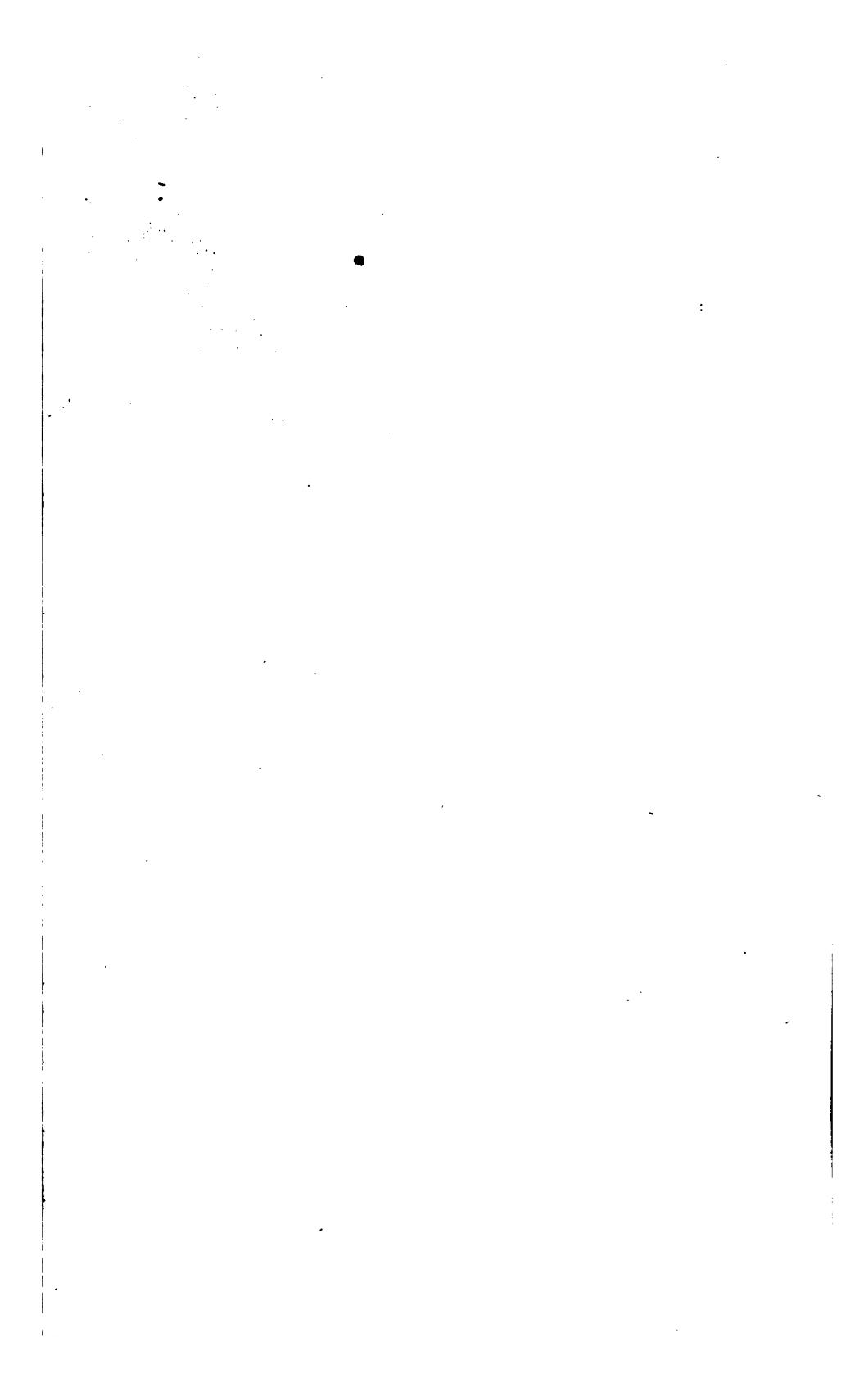
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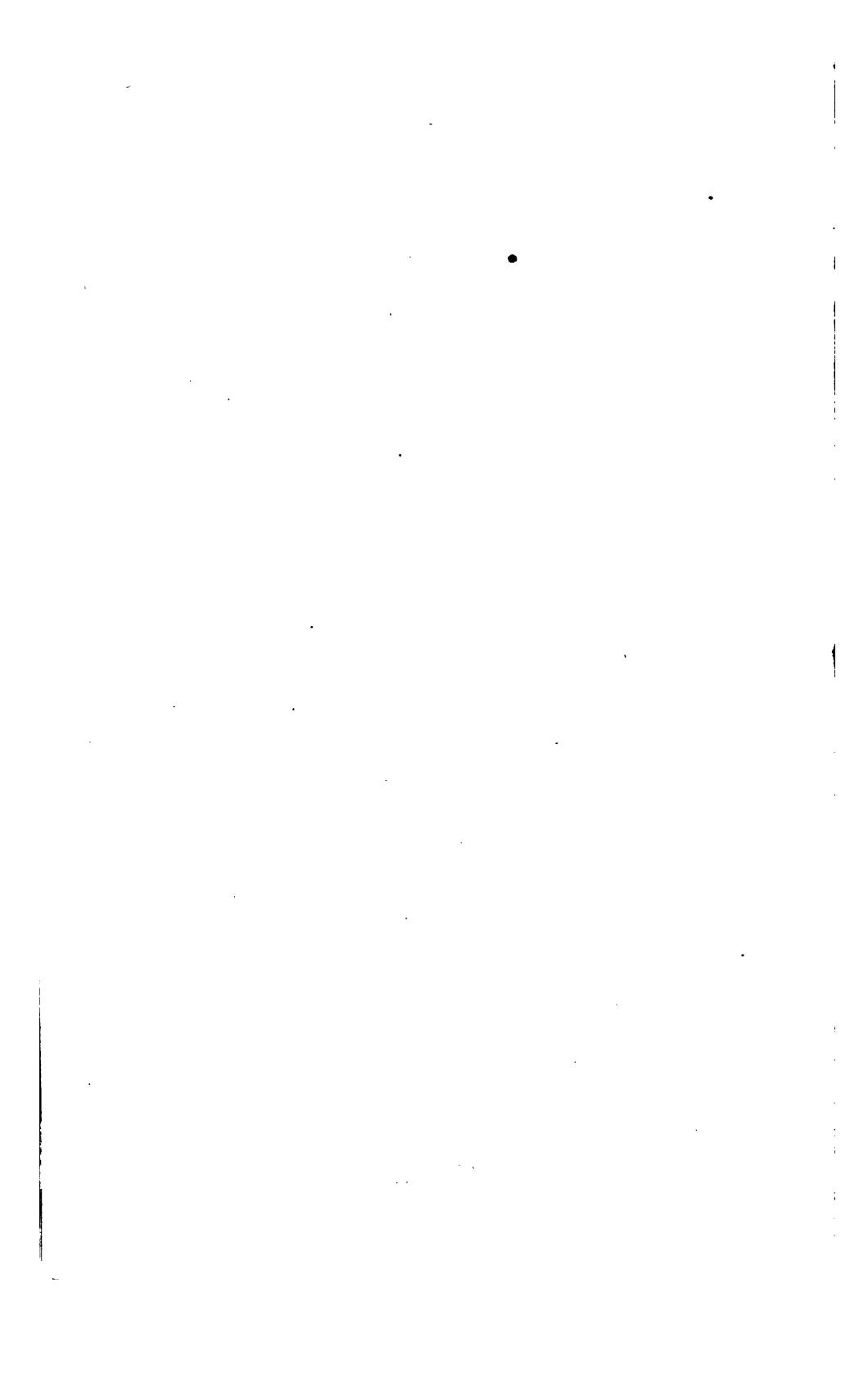


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CONDUCTED  
**BY W. NEWTON,**  
CIVIL ENGINEER AND MECHANICAL DRAFTSMAN,  
(Assisted by several Scientific Gentlemen.)

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**VOL. IV.**  
(CONJOINED SERIES.)

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## LIST OF PLATES IN VOL. IV.

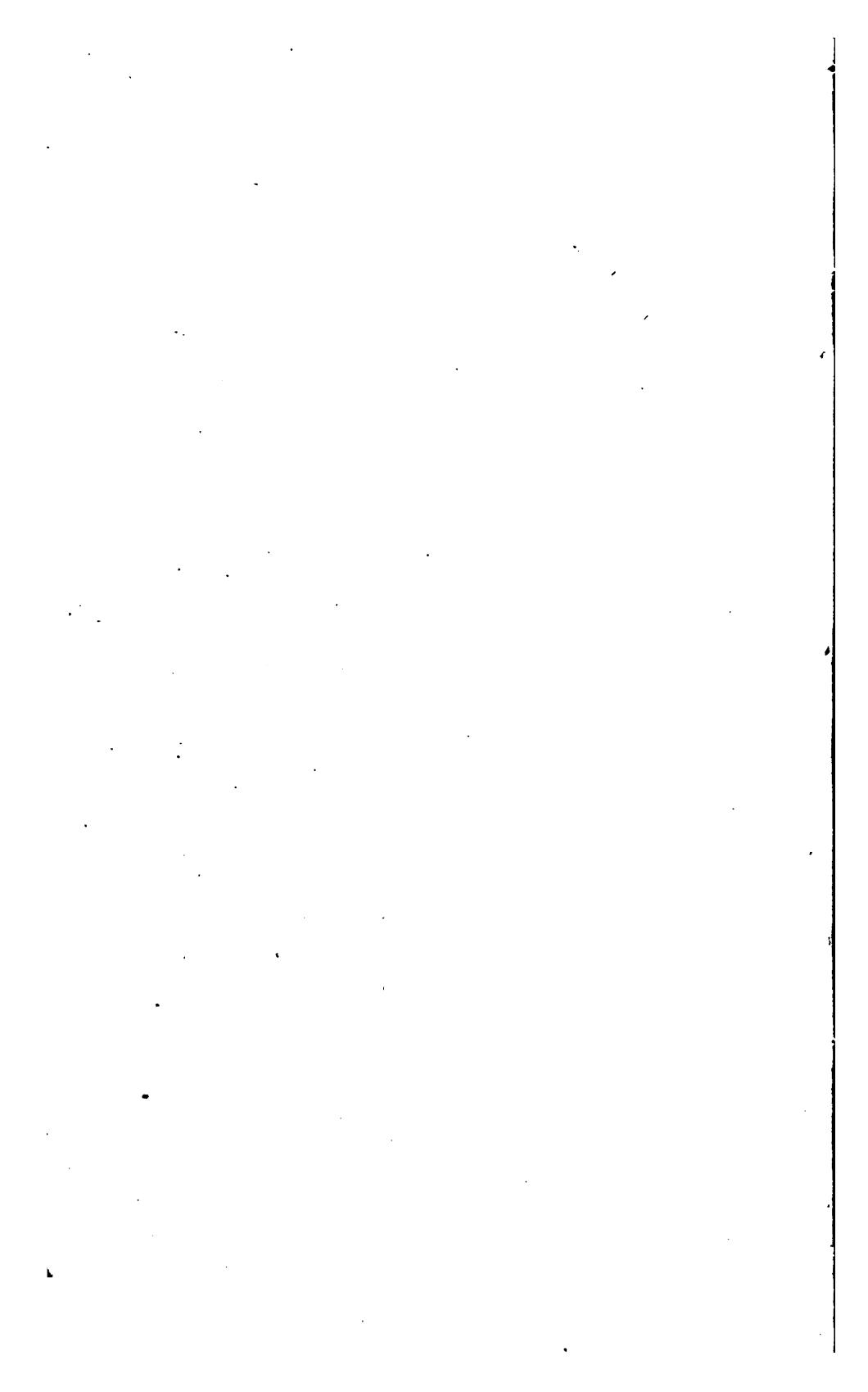
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THE  
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No. XXII.

*CONJOINED SERIES.*

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**Recent Patents.**



To WILLIAM NEWTON, of the Office for Patents, Chancery Lane, in the county of Middlesex, civil engineer, for certain improvements in machinery called roving frames, for roving cotton, and other fibrous substances; being a communication made to him from a foreigner residing abroad.—[Sealed July 11th, 1833.]

THESE improvements in machinery called roving frames, for roving cotton and other fibrous substances, consist in a peculiar mechanism for, and mode or method of winding filaments of cotton, or other fibrous materials, into cops or rolls, in the state of preparation called rovings; such rovings of filaments being intended to be afterwards elong-

ated and spun into yarns by the operations of the mule jenny, or throstle, or other spinning machinery.

In this improved roving frame it is proposed to substitute, in place of each spindle and flyer of the ordinary bobbin and fly frame or other roving machinery, an apparatus consisting of a slight frame or carriage, which supports a vibrating guide with certain rollers for conducting to and winding the roving in a compact state on to the bobbin; this apparatus is denominated a *waltzer spindle*.

The several figures in Plate I. represent one of the improved waltzer spindles detached from the roving frame, as it would appear in different positions. Fig. 1, may be considered as the front view; fig. 2, the back view; and figs. 3, and 4, are vertical sections, the side of the carriage being removed for the purpose of showing the ends of the rollers, and other parts, more perfectly. The several detached figures will be explained hereafter. The several letters refer to corresponding parts in all the figures.

These waltzer spindles are adapted for and may be applied to the various kinds of known machinery for producing rovings, having draft rollers above in the manner of the bobbin and fly frame, and are capable of winding masses of roving on to bobbins without flanges, not in the ordinary shape of the bobbin cops, but in short thick cylindrical rolls with conical ends, such rolls containing very considerable lengths of roving, which will readily unwind and deliver in the creel of the mule or other spinning machine, and will occupy less room in height than is required by the usual cops.

A parallel frame or carriage *a, a, a*, of iron or other metal, connected at top and bottom, supports the axles of the winding roller and its driving gear. This frame or carriage is attached at bottom to the spindle *b*, and at top to the tube or hollow neck *c*, upon which spindle and

neck, as pivots, the whole of the piece of mechanism is intended to revolve.

At *d*, is represented a portion of the lower rail of the machine, upon which the spindle *b*, is supported, turning as usual upon its lower pivot in the cup *c*. A portion of the upper rail of the machine is also shown at *f*, wherein the neck *c*, is held by a loop, as seen in the top view, fig. 6. The front pair of drawing rollers are represented above at *g*, from whence the filament of roving is delivered, and passes down through the tube *c*, to the wooden bobbin *h*. The bobbin bears upon the periphery of the winding roller *i*, and, as that roller revolves, the bobbin is made to revolve also by the friction of contact, which causes the filament of roving to be progressively wound upon the bobbin.

A pulley *k*, is fixed upon the lower part of the spindle *b*, for the purpose of driving the spindle by a cord as usual, which gives rotary motion to the carriage *a*, *a*, and its appendages. A similar pulley *l*, is fixed upon a short tube *m*, that turns freely round the spindle, which pulley is driven also by a cord, giving rotary motion to the tube *m*, and the gear connected thereto, independently of that by which the spindle is turned.

The axle of the winding roller *i*, passes through circular holes in the sides of the carriage, and is confined therein by caps or collars. At one extremity of this axle, a toothed wheel *n*, is affixed, taking into a pinion below on one end of the short axle *o*. The reverse end of this short axle carries a bevel pinion, taking into a similar bevel pinion fixed to the rim of the short tube *m*. Hence, it will be perceived, that the rotary motion given to the pulley *l*, and tube *m*, will be communicated, through the gearing last described, to the winding roller *i*, and cause that roller to turn upon its axis.

The bobbin *h*, may be a cylindrical tube of wood with-

out flanges, having a weighted axle passed through it, which is for the purpose of causing the bobbin to bear heavily upon the periphery of the winding roller, in order to create friction at the parts in contact.

The axle of the bobbin turns in slots in the sides of the carriage *a*, *a*, which enables it to rise as the accumulation of roving wound upon the bobbin increases its diameter.

In figs. 1 and 3, the naked bobbin is shown, bearing upon the winding roller; in figs. 2 and 4, the bobbin is shown partly filled with roving, and consequently raised up from the winding roller. The end of the cord of filaments or roving being conducted from the front drawing rollers *g*, through the tube *c*, it is brought between the winding roller *i*, and bobbin *h*, and passed round the bobbin, upon which it necessarily winds as the bobbin revolves, by its contact with the winding roller. But in order to lay the rounds of roving in regular succession, side by side, upon the bobbin, and form the cop or roll of roving in a suitable shape, a vibrating guide is employed, which is constructed and made to act in the following manner:—

From a bracket *p*, at top of the carriage *a*, a bent arm or lever *q*, *q*, is suspended by a joint, at the lower extremity of which arm there is a tooth *r*, working in a spiral groove, cut round the periphery of the winding roller *i*. This tooth is shown detached in two positions, at figs. 7 and 8.

As the winding roller *i*, revolves, its spiral groove leads the tooth, and with it the arm or lever *q*, to and fro in lateral directions, producing that vibrating action of the arm which is essential to its guiding the cord of roving uniformly upon the bobbin. There is a bar *j*, placed behind the end of the vibrating lever *q*, to prevent the tooth rising out of the groove.

A brace or stretcher *s*, attached to the sides of the car-

riage *a*, supports the joint of a smaller arm or lever *t*. This lever has two pieces *u*, *u*, affixed to its back, having holes or eyes, in which a rod *v*, slides up and down. The lower end of this rod *v*, carries a swivel guide *w*, (shown detached at figs. 9 and 10), and the two levers *q*, and *t*, are connected by a pin and slot joint *x*. The cord of roving descending into the waltzer spindle by the tube *c*, is passed, first, through the wire eye or guide *y*, at the upper part of the frame, and then through a similar wire guide at the lower part of the front of the lever *t*, and ultimately through the swivel guide *w*, by which it is immediately led to the bobbin.

It will now be understood, that by the rotation of the pulley *k*, the spindle with the carriage and bobbin is made to revolve horizontally, and to give that slight degree of twist to the cord of filaments as it descends, which is required in making rovings. And it will also be perceived, that by the rotation of the pulley *l*, the gear is driven which gives rotary motion to the winding roller in a vertical direction, and produces the taking up or winding of the roving upon the bobbin by the friction of the two surfaces of *h* and *i*. In order to obtain sufficient tension to wind the roving tight upon the bobbin, after conducting the roving through the wire eye of the guide *w*, it may be passed once or twice round the projecting pin of the swivel, and then through the small hole in the swivel piece.

But as the traversing the swivel piece upon the surface of the cop would be subject to inconvenience, by occasionally catching in the roving, the swivel piece is prevented from being brought into contact with the cop by introducing an axle or rod *z*, the ends of which slide loosely in the slots of the carriage, in the same way as the axle of the bobbin. This axle or rod constantly bears upon the bobbin, or upon the upper part of the cop of roving, rising according

to the increasing diameter of the cop, and thereby forms a smooth firm surface for the swivel guide  $w$ , to traverse upon.

It will, however, be necessary to keep the swivel guide always in the same position, and for this purpose a small pin is passed through the lever  $t$ , into a long groove cut in the guide rod  $v$ , by which means the rod and the guide will be prevented from turning round; and in order that the swivel piece  $w$ , shall always keep the same horizontal position, it is made to turn or swivel, upon a pin, the rod  $v$ , that carries it, as shown by the detached figs. 9 and 10.

By the mode in which the levers or arms  $q$ , and  $t$ , are constructed, and the sliding rod  $v$ , of the swivel guide connected thereto, it will be perceived, that as the cop of roving increases in diameter, the swivel guide  $w$ , will be raised, and the extent of its vibratory movement will be contracted; consequently, though the guide at first lays the roving in coils round the bobbin from end to end, yet, as the increasing diameter of the cop raises the guide, the angle of its vibrating movement will be diminished, and the traverse being progressively shortened, the ends of the cop will assume conical forms, as shown in figs. 2 and 4, and in the detached figs. 11 and 12, which represent a section and end view of a cop or roll of roving when complete. These last mentioned figs. also show the manner in which the bobbins may be weighed by a cylinder of lead filling the interior, the axle passing through the middle; which cylinder, as well as the axle, may be readily slidden out of the wooden tube or bobbin.

In order to remove the bobbin from its carriage when the cop of roving is complete, the bobbin must be raised until its axle comes opposite to the enlarged parts of the slots in the sides of the carriages, (seen best in the detached fig. 5,) when the axle may be driven out and the bobbin withdrawn, and replaced by an empty bobbin, as in figs. 1 and 2.

The Patentee concludes his Specification in the following manner :—" Having fully explained the particulars of these improvements in machinery for roving cotton, and other fibrous substances, I desire it to be understood, that I do not claim the several parts of the mechanism described, separately and apart from their combination, as similar mechanical contrivances may have been heretofore partially employed in other combinations ; but I claim a mode of forming the roll or cop of roving with conical ends by means of a sliding guide, the traverse of which is regulated and determined by the increasing diameter of the roll or cop ; and I also claim the particular combination of mechanism described above for effecting that object."—[Enrolled in the Rolls Chapel Office, January, 1833.]

Specification drawn by Messrs. Newton and Berry.

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To GEORGE OLDLAND, of Hillsley, in the parish of Hawkesbury, in the county of Gloucester, cloth-worker, for his invention of certain improvements in machinery or apparatus for preparing, dressing, and finishing of woollen cloth, and other fabrics. —[Sealed November 3d, 1832.]

THESE improvements in machinery or apparatus for preparing, dressing, and finishing of woollen cloths and other fabrics, consist in different organisations or modifications of, and variations from an invention, for which Mr. Oldland obtained a Patent, dated twenty-second day of July, one thousand eight hundred and thirty, (for Report of which see London Journal of Arts, Vol. III., Conjoined Series, page 187,) the Specification whereof was duly enrolled in the Roll's Chapel Office, in Chancery, on or about the twenty-second day of January, one thousand eight hundred and thirty-one. By reference to the said Specification, it

will be seen that the Patentee adopted certain frames, handles, or holders, containing teazles, or wire cards, brushes, or any other suitable material for dressing cloth, which frames, handles, or holders are to be brought against the face of the cloth under operation for raising the pile, and there made to revolve on a metal spindle, or by any other convenient means, and which are intended, by a circular movement of the points of the teazles, brushes, or other materials, to draw out the fibres of the wool, or, in other words, to raise the pile of the cloth crosswise, that is, in the direction from the middle towards the lists.

These improved organisations, or modifications of and variations from the said former invention, consist, first, in a new mode of adapting the circular frames, handles, or holders, with the teazles, or wire cards or brushes, by which the points are enabled to operate crosswise upon the cloth as it travels in vertical directions ; and, secondly, in a mode of enabling frames, or handles, or rods of teazles, or wire cards, or brushes, to act upon the face of the cloth by reciprocating horizontal movements, that is, crosswise of the cloth in directions from list to list, as the cloth travels in vertical directions. These improvements will be better understood by reference to the several figures in Plate I., and the following description thereof ; fig. 13, is a front view of the machine, in which two large circular frames, holding teazles, wire guards, or brushes, are mounted, and which are made to revolve in vertical directions on central axles or shafts ; fig. 14, is an end view of the machine ; and fig. 15, a transverse section taken through the same, for the purpose of showing more perfectly its internal construction ; *a, a, a*, is the frame-work or standard of the machine, made of wood or iron, and firmly braced together ; *b, b*, are axles or shafts, mounted in plummer blocks fixed upon the horizontal rails of the standards, which shafts slide to and fro in their bearings, as well as turn freely ; at one end of these

shafts a large circular frame *c, c*, is attached, and in these frames the rods of teazles, or wire cards, or brushes are fixed in any convenient way ; at the reverse end of the shaft is the fork for sliding it to and fro.

The cloth intended to be operated upon, is wound upon a cylinder *d*, and its end being passed from thence over a guide roller *e*, it is carried upwards, its back bearing against the elastic bed *f, f*, and over the other guide roller *g*, to a corresponding cylinder *h*, to which the end of the cloth is made fast. The bed is affixed in a perpendicular position to the frame work, and is proposed to be made elastic by surfaces of bristles, set in boards like brushes.

In commencing the operation of raising or dressing, the cloth being distended over the bed as described, the axles *b, b*, are滑en forwards in their plummer blocks, in order to bring the circular frames of teazles, wire cards, or brushes into contact with the face of the cloth, and they are held in these advanced positions by weighted levers *i, i*, shown in fig. 15, acting upon the forks *j, j*, or they may be pressed forwards by strong spiral springs. The frames of teazles, or boards of wire cards, or brushes, are made to revolve by means of toothed wheels *k, k*, fixed on the shafts *b, b*, which are driven by a spur wheel *l*, on the shaft of the rigger *m* ; upon this shaft *m*, there is a bevel wheel *n*, taking into a similar wheel *o*, and at the reverse end of the axle of *o*, a pinion is fixed, that drives the wheel *p*, which takes into the wheel *q*, locked to the end of the cylinder *h*, by a clutch, and the wheel *q*, takes into a similar wheel *r*, upon the end of cylinder *d* ; by the rotations, therefore, of these wheels, the cloth is drawn lengthways progressively over the bed, as the rotary teazles, boards of wire cards, or brushes are acting upon its face in a cross direction, or from the middle towards the lists. When the entire length of cloth has passed from the cylinder *d*, to the cylinder *h*,

as described, it may be made to travel back again from *h*, on to *d*, by shifting the clutch so as to release the wheel *q*, and lock the wheel *r*, to the cylinder *d*, these cylinders being retarded by friction levers *s*, *s*.

In this way, the length of the cloth may be carried to and fro through the machine, while the frames of teazles, boards of wire eards, or brushes are in continued rotary operation. Fig. 16, is a front elevation of a machine, in which long straight rods of teazles, or boards of wire cards, or brushes, are made to operate upon the face of the cloth by reciprocating horizontal movements, in directions from list to list, as the cloth travels upwards and downwards in vertical directions. Fig. 17, is an end view of the same, and fig. 18, a section taken transversely through the machine; *a*, *a*, *a*, *a*, are the standards of the machine; *b*, *b*, *b*, *b*, are the sliding frames, which carry the rods of teazles, or boards of wire cards, or brushes; the ends of these sliding frames are elongated, and may work in oblique slots or bearings in the standards, or may be otherwise supported; *c*, *c*, is a board, on which beds *d*, *d*, *d*, *d*, of bristles or other elastic materials are fixed; *e*, is a cylinder, in which the length of the cloth is in the first instance wound; *f*, *f*, *f*, *f*, are rollers for guiding the cloth against the beds; *g*, is a corresponding cylinder, to which the end of the cloth is attached upon the opposite side of the machine after passing it over the rollers *f*, *f*, *f*, *f*.

When the cloth has been thus distended over the beds, the boards *c*, *c*, are brought forward to bear the cloth up against the teazles or boards of wire cards or brushes, which may be done by raising a lever *h*, and allows the arms or bearings of the bed board to slide down in the inclined slots *i*, *i*, *i*, *i*, in the standards, when the weight of the bed boards will be sufficient to keep the cloth in contact with the teazles, wire cards, or brushes on each side of

the machine ; but the Patentee does not confine himself to this method of hanging the beds.

In putting this machine into operation, rotary power is to be applied to the rigger *k*, which will drive the crank shaft *l* ; and the crank rod *m*, being connected to the levers *o*, *o*, they will be made to vibrate or move up and down as the crank shaft goes round. Upon the axles of these vibrating levers *o*, *o*, there are affixed forked arms *p*, *p*, the ends of which forks take into slots in the sliding frames *b*, *b*; and, consequently, as the levers *o*, *o*, vibrate, the sliding frames, with the teazles, or wire cards, or brushes, are worked to and fro, and thus operate in dressing or raising the pile on the face of the cloth ; but the sliding frames may be moved by other mechanical means, if thought to be more convenient. Breaks or weighted levers are adapted to the cloth cylinders, as shown at *q*, *q*, for the purpose of keeping the cloth tightly distended while under operation. The cloth is drawn progressively through the machine over the beds by means of bevel gear connected to the crank shaft pinions *r*, *r*, fixed on the crank shaft, taking into bevel wheels *s*, *s*, which turn loosely on the ends of the axles of the cloth cylinders ; either of these wheels may be locked to the axle of the cylinders by a clutch moved by the lever *t*, and when so locked that cylinder becomes a drawing cylinder, and upon which the cloth winds as it travels through the machine, the other cylinder turning freely.

If it should be deemed necessary to withdraw the beds at stated times, for the purpose of relieving the teazles or wire cards from the face of the cloth, that might be done by excentrics, or cams, or cranks, connected with the axles of the cloth cylinders, which, by revolving, might actuate the levers that shift the beds ; or if it should be thought more desirable to give to the teazle holders or boards of

wire cards, advancing and receding movements at intervals, that might be effected by firmly fixing the beds and mounting the teazle holders or boards of wire cards in moveable frames, which may be suspended and moved in a similar way to that by which the shifting beds are described to be attached to the standards, and moved by excentrics, cams, or cranks connected to the axle of the cloth rollers, or by any other convenient means.—[*Enrolled in the Rolls Chapel Office, May, 1833.*]

Specification drawn by Messrs. Newton and Berry.

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*To ALEXANDER MITCHELL, of Brickfield, in the parish of Ballymacarrett, county of Down, in the kingdom of Ireland, civil engineer, for his invention of a dock of improved construction, to facilitate the repairing, building, or retaining of ships and other floating vessels.—*  
[Sealed 4th July, 1833.]

THE Patentee describes his invention of a dock of improved construction to facilitate the repairing, building, or retaining of ships and other floating bodies, to consist in the application of several close water-tight boxes or cases, or rafts of timber, combined in such a way as to form a flooring for the support, or carrying, or bearing upwards of the vessel or other body to be repaired, by the buoyancy or power of floatation of the said boxes or rafts in water; and in his mode of applying such boxes to the specified purpose, he proposes to employ, commonly, for retaining the pontoons in their proper places, piles, posts, or beams, or metal pins, or mooring chains, furnished at their lower ends with a spiral flange or worm of metal, for the purposes of facilitating

their introduction into or extraction from the ground, and of giving them a firmer hold therein; which piles or mooring chains, with their pins, so armed, are also applicable to other purposes, for which other uses he claims them as parts of his present invention under these letters patent. The Patentee also employs those close boxes commonly known by the names of pontoons or caissons, or the rafts of timber in some cases, of such magnitude and in such number as shall be adequate to support out of the water, by their combined buoyancy, the largest vessel of the class the dock is designed to take in; and the pontoons are so affixed to each other, and stationed in a tide water, not exposed to swell or strong current, that they may rise and fall together with the ebb and flux of the tide, or that they may be retained at pleasure at their low water level, whilst the water of the floating tide rises above them.

For a floating dock to hold vessels, in admeasurement below or not much exceeding sixty-four feet keel, and eighteen feet beam, it is proposed to employ three caissons, of the dimensions of about forty feet in length, fourteen and a half feet in width, and three feet in depth, outside measure. These caissons must be sufficiently strongly framed and timbered to bear the strains and pressure to which they will have to be exposed, and seamed so securely as to prevent as much as possible leakage under the great pressure of their load. For caissons of the dimensions above stated, the floor timbers should be a keelson of at least twelve inches square, with two other long joists or timbers, about eight inches square, lying longitudinally midway betwixt the keelson and side pieces, and that the side and end pieces of the floor frame should be about fourteen inches wide by eleven inches deep: these floor timbers should be matched together, and laid flush on their lower sides. The corner pieces

may be short pieces of fourteen inches square, notched into the angles of the floor frame, and set upright, and the side and end timbers about eight inches square, notched and set upright in like manner upon the exterior timbers of the flooring: these may be set at about eighteen inches space and timber.

On the inner faces of the upright timbers, cleats, running the length of the sides and ends, should be affixed, to take the ends of the deck beams and of the deck planks, the upper surface of the side cleats being below the top of the timber about four inches, as that of the end cleats on the level of the top of the beams. The deck beams should be about eight inches square, and distant from each other three feet, beam and space; they should be dovetail-notched at the ends into the cleats. The cleats may be at first spiked to the side timbers; but when the side planks are put on, the same trenails which hold the planks may pass through the cleats and hold them too. The cleats may be about eighteen inches deep--six inches on the upper face, and three inches on the lower. The floor planks run transversely about twelve inches broad by three inches thick, and are trenailed to the flooring timbers. The side and end planks should be, to have as few seams as possible, eighteen inches broad, five inches thick, and trenailed to the upright timbers. The deck planks run lengthwise of the vessel, about six inches broad by two and a half inches thick, and nailed to the beams. In laying the side and end planks, it should be observed that the outer ends of the upper side planks should come flush with the end of the caisson, and the outer ends of the lower end planks flush with the sides of the caisson, that the downward pressure may not tend to open the seams.

To give greater stiffness to the vessel, to resist pressure from without, braces may be set in the way of principals,

from notches near the ends of the keelson up to the middle beam, through which a ring bolt may be passed, to be screwed down by a nut to a stirrup iron bolted across the middle of the keelson. Shores or props may also be fixed betwixt the beams and the flooring timbers in their lines of intersection.

To make a platform of the caissons, or floor of the floating dock, they must be placed in the water parallel to each other, about five or six feet apart, and connected by strong beams laid across their decks and running the whole length of the proposed flooring. Two of these beams, about sixty feet in length, or rather more, and fourteen inches square, are to be laid across the caissons, at equal distances from the middle transverse line, and about eight feet asunder. These we will call the side strokes, and across them transoms are to be laid, on which the keel of the ship or vessel is to rest. Two other beams of similar scantling are to be slit, and the fitches, blocked apart to the distance of thirteen or fourteen inches, are to be bolted together in pairs, and placed parallel to the side strokes, the opening betwixt the fitches being vertical, within about eight feet of each end of the caissons. These double or slit timbers we may distinguish by the name of holding beams. All the long beams lying across the decks of the caissons must be made fast to each caisson in some suitable way, so as to lock together the whole floating platform; the mode exhibited in the drawings, by straps, staples, and pins is efficient and convenient, as allowing the caissons to be shifted farther from or nearer to each other at pleasure. The spaces betwixt the fitches of the holding beams are to admit the passage of the piles which retain the dock in its situation in the water, and must be sufficiently wide to allow of the easy rise and fall of the dock with the tide by their guidance.

To retain the dock in its situation, but to allow it, when necessary, to rise and fall with the tide, I commonly employ piles, set upright in such a way as to prevent the current from displacing the floating flooring, and at the same time to serve as guides to it in its motions of ascent and descent with the variable level of the water. The mode of arranging the piles as shown in the drawing, fig. 1, Plate I, where they pass through the spaces betwixt the flitches of the holding beams, is generally, perhaps, the most convenient for the business of a repairing dock, but circumstances may occur under which this mode of placing them may be departed from with advantage.

The piles so to be employed for retaining the floating dock in its situation in the tide-water may be of the ordinary kind, namely, beams or sticks of timber pointed or cut wedge-shaped at their lower extremities, and shod so as to admit of their being driven firmly into the ground by the ram in the ordinary way; the Patentee considers his floating dock, fitted with such piles, to be completely effective for all its designed purposes; but in the place of such ordinary piles, he prefers to use, in the construction of his aforesaid dock, piles otherwise fashioned, and fitted with an apparatus, by means of which they can be inserted into the ground without the aid of a ram or pile driver, or can be easily removed therefrom at pleasure, and by means of the same, when in the ground, they have greater power of resisting upward or downward pressure.

The apparatus which is so employed to give the piles these properties, is a broad and short worm or screw of cast iron, fitted on the lower extremity of the stick. This worm is a broad flange, coiling heliacally about one and a half turns round a hollow socket, and cast together of one piece, the worm plate turning off gradually from where it springs from the socket to its outer margin. The circumferential line

of the worm describes a double volute in reference to the axis of the socket, curving spirally inwards towards the centre at both its terminations. Such a form facilitates its cutting through the ground, and, with the same view, the edge is made more acute on those portions of the curve which run in towards the socket. The socket is a short tube, either cylindrical, conical, or prismatic, which receives the lower end of the pile, shouldered down and shaped to enter and fill its cavity, and having its extremity passing a little through the socket, shod with a conical iron ferule, to enable the instrument more readily to penetrate the ground. Two or more thorough-pins driven through the timber and holes in the socket, and rivetted at the ends, secure the worm to the pile. The piles, so armed, can be readily inserted into penetrable ground, by setting them vertically in their assigned places, their points downwards, and turning them round by means of cross levers. In the same way, by a reverse rotation, they can be readily withdrawn when occasion requires.

In some cases, where it may be thought expedient for merely temporary purposes to dispense with the insertion of piles to retain the dock, or where the force of the current may make it advisable to use means to lessen the lateral stress upon the piles when used, I employ the same kind of worm as above described, fitted with a central pin of iron, and a shackle on a loose collar, to obtain through a strong chain a secure and convenient mooring.

The central iron pin for this form of the apparatus is pointed below, and fits into the tapering cavity of the socket, the pointed end passing through; and above the upper margin of the socket it stands up so far as to admit on the upper part of the shaft of the pin, which is cylindrical, a strong collar of iron, which turns easily upon it, betwixt the margin of the socket and a projecting shoulder

on the pin. The central pin and the socket are fixed to each other by strong thorough-pins. The head of the central pin, above the shoulder, is made pyramidal or prismatic, to receive the key which is used to turn it into or out of the ground.

The loose collar has two projecting journals forged on it, to receive the eyes of a shackle, by which a mooring chain is connected with it. This loose collar, allowing the pin to turn within it whilst the worm is being screwed into or out of the ground by means of the key, prevents any impediment to the operation from the chain. The key for acting on this screw-mooring, is a socket of iron, fitting upon the head of the central pin, and having a shaft of suitable length for the proposed depth of water, and of insertion into the ground. It is found convenient to make the shaft for the key of wrought iron tube, in about ten feet lengths, four to six inches diameter, and a quarter or three-eighths thick. These tubes, filled with wood inserted wedgewise, are solid and light, resist torsion with sufficient power.

The lengths of shafting may be conveniently joined together by a short pin or piece of smaller tube, fitting within the outer tube at one end and projecting eight or ten inches out of it, so as to receive upon it the end of the next piece of shafting: fixed and moveable steel pins, passed through the outer and inner tubes, will hold them together; but to connect the lengths more securely to resist torsion, it will be advisable to scarf or notch the ends of the outer tube, so as to fit like teeth into each other. To obtain a hold of the shaft for the purpose of turning in or out the mooring-screw, it may be necessary to weld or pin upon the shaft, at convenient distances for allowing the cross levers to be worked, angular bosses, on which a plate key, well fitted, can be passed over from one to another.

The piles for a floating dock should be sticks of timber,

of twelve or fourteen inches square, and of sufficient length to stand five or six feet above high-water mark at spring tides, when inserted from twelve to twenty feet into the ground. All the tide range of the pile should be left square, the lower part may have the angles dressed off, and be gradually rounded as far as it is to enter the ground, and tapered and shouldered to fit into the socket of the worm. To stiffen this portion of the pile against twisting, strong hoop iron may be coiled and nailed upon it spirally, in a direction contrary to that of the thread of the worm. On the two opposite flat faces of the piles, which are to stand parallel with the long timbers of the dock, plates of iron of from four to five feet in length, about six inches broad, and three-quarters an inch thick, are laid in flush, and screwed or bolted on the lower ends of the plates, being about low-water mark. These plates are perforated correspondently with holes of from two and a half to three inches diameter and about three inches apart, and the timber is to be bored coincidently with the plate holes, to allow a wrought-iron pin filling the bore to pass through. As the dock rises and falls with the tide, the flitches of the holding beams will move along the faces of the perforated plates, but when it is necessary to hold down the flooring of the dock to prepare it to receive a vessel, the iron pins, stretching across the flitches of the holding beams, must be introduced into the proper holes at low water, and the tide will then flow over the caissons and flooring timbers. To stiffen the piles as they stand in their places by tying them one to another, and at the same time to obtain a convenient gangway, a platform of planks is fixed on the heads of the piles, running the whole length of the dock on each side.

To keep the vessel in its upright position until the water leaves the floor of the dock, there must be bearing bars, which can be brought up and held securely against the

vessel's sides by shores. These may be efficiently arranged in the following way:—On the sides of the caissons there must be bolted or screwed strong perforated iron plates, corresponding in length and situation with the spaces betwixt the side strokes and the holding beams; the plates may be about seven feet long, five inches broad, and half an inch thick, and perforated with a row of holes of one inch and a quarter diameter, and one foot apart. The plates must be so set that the holes come opposite to the near lower edge of the cleats on the side timbers, in order that the pins which are to pass into the plate holes may go through the planks and cleats to get a stiffer hold, and, being drawn inwards by nuts on the tails of the pins, give some additional strength to the sides. The pins should have conical shoulders to drop into counter-sunk holes in the plates, and the tails may taper inwards where they pass through the planks and cleats, that, as they are drawn up by the nuts, they may be made to fill completely the holes in the timber, projecting outwards beyond the plate. The pins should be cylindrical, and have six or seven inches of length. Pieces of oak scantling, about twenty feet long, nine inches broad, and five inches thick, having an iron hoop near their lower ends, drilled to admit the projecting pins, are set on the pins, one for each side of the vessel, on both sides of each caisson, so that they are carried on the pins, and can turn upon them as centres through a certain range.

They may be secured on the pins by cotters and washers, and readily shifted from one pin to another, according to the different breadths of vessels to be supported. The upper ends of these supporting pieces or bearing bars, when thrown back, preparatory to the admission of a vessel into the dock, rest against the edge of the gangway on the pile heads. To bring the supporting pieces up against the

sides of the vessel, and hold them there, shores are placed behind them, having their abutments in cast iron shoes, bolted upon the decks of the caissons, their upper ends pressing against the back edges of the supporting pieces, and being prevented from slipping sideways by a clip of iron on each side. These shores may be brought forward, and made to press the supporting pieces up against the ship's sides, and to hold them there by a tackle, strained betwixt the upper end of the shore, and a ring bolted into the deck of the caisson, as shown in the drawing.

To prepare the dock for receiving a vessel, it will be necessary at low water to pin down the flooring by passing the strong pins through the holes in the piles nearest above the upper surface of the holding beams. The supporting bars are to be thrown back to rest against the gangway. The transoms lying across the side strokes at about six feet apart, and blocked under their middle, are to be secured in their places by dogs. The rising tide will then flow over the flooring of the dock. At high water the vessel to be docked must be brought into such a situation that its keel, as the vessel drops with the ebbing tide, will take the middle of the transoms. This may be readily accomplished by making the bearing bars to press against her sides by pulling at the tackle-falls from the gangway. When she has settled down into her place and rests upon the transoms, the docks being left by the water, the vessel must be made safe in her upright position by shoring from the decks of the caissons to her sides. At low water the pins may be struck out of the piles, and with the returning tide the vessel will be borne up by the buoyant flooring. When the vessel is to be removed from the dock, the flooring must be again pinned down at its low water level, and the rising tide will then float off the ship.

In the drawings which are referred to, (see Plate I.,)

and form part of the specification, the same parts are in the several figures distinguished and referred to by the same letters or marks. In the actual structure of such docks, the dimensions and proportions of the whole or of parts may be varied according to circumstances.

Fig. 19, is a horizontal view of the dock; fig. 20, a transverse section; fig. 21, a side elevation of a mooring worm or screw, and its several parts. A, is the caisson; B, long beam, named a side stroke; C, long beam, slit, and blocked out, named a holding beam; D, transom E, pile; F, block; G, supporting piece or bearing bar; H, shore; I, gangway; K, worm; L, tackle; M, ship; N, cross levers to turn the piles; *a*, pins and plates on sides of caissons; *b*, shoring shoe, bolted on the deck; *c*, holding straps or stirrups; *d*, cross pins to hold down the floor of the dock when required; *e*, shoe or ferule of the pile; *f*, pin or shaft of the mooring screw; *g*, loose collar; *h*, shackle. The worm for the piles or for the mooring screws may, of course, be varied in dimensions, say from two to five feet, or more or less, according to the nature of the ground, or the degree of resistance called for by the work in which they are employed.

The Patentee states, in conclusion, that his invention consists, in the first place, in the formation of a graving dock with a buoyant flooring, which being held down by any suitable contrivance at its level of low water, in a tide way, when desired, can be subsequently liberated so as to rise and fall with the tide, and to carry upon it the ship or vessel to be repaired or built; and claims such a dock with a floating floor to be of his invention, under the privileges of the before recited letters patent, whether the buoyancy of the floor be obtained by the means of hollow air-tight vessels, such as the caissons herein described, or by the means of any other form of hollow air-tight vessel suitable

for the purpose; or whether the buoyancy of the floor may be derived simply from the specific gravity of the materials employed in its construction being less than that of the supporting medium; and claims as of his present invention such a dock with a buoyant flooring, whether the flooring be retained in its situation and guided in its rise and fall by piles, as herein shown, or otherwise arranged, or whether the movements and position of such flooring be controlled and regulated by the means of mooring chains or cordage, however arranged and made fast. And declares his invention under the present letters patent further to consist in the application to the lower end of a wooden pile, or to a metal pin or shaft, of a broad metal screw or worm, for the purpose of enabling such a pile or pin to be inserted into, or extracted from, the ground, by causing it to turn upon its axis by means of cross levers, when it is placed with its point directed upon penetrable ground; and he claims, under the privileges of the before-mentioned letters patent, piles, pins, or shafts, so armed with broad metal worms or screws, whether the same be employed in the construction of a dock, as herein described, or for piling ground for the support of buildings or embankments, or to obtain a secure hold of the ground for the purposes of mooring or holding fast ships and other floating or stationary bodies; but he does not claim any exclusive right to the use of such other things mentioned or described in his Specification, which are well known and of common use, except in so far as they may be applied to the especial purposes of his invention.—[*Enrolled in the Enrollment Office, January, 1834.*]

Specification drawn by Mr. Toplis.

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*To CHARLES TERRY, of Shoe-lane, in the city of London, merchant, and WILLIAM PARKER, of New Gravel-lane, Shadwell, in the county of Middlesex, merchant, for their invention of improvements in making or refining sugar.—[Sealed June 26th, 1833.]*

THE Patentees describe their invention to be, first, in preventing or diminishing fermentation in the process of making sugar, and in the process of refining sugar, by the use of what they call ferrocyanic acid for that purpose; and, secondly, in the process of either refining or making sugar, promoting and increasing that effect called crystallisation, and producing larger quantities of sugar by the use of sulphuric acid for that purpose.

The Patentees further describe their invention as follows:—"We use three solutions, hereinafter described, and called, for the sake of distinction, solution No. 1, solution No. 2, and solution No. 3.

" For solution No. 1, take ten ounces avoirdupois of crystallised sulphate of zinc, and dissolve it in three gallons of cold water, then add three ounces measure of sulphuric acid, specific gravity 1845. This is sufficient for one ton raw sugar.

" For solution No. 2, take nineteen ounces avoirdupois of best Prussian blue, in powder, and six ounces and a half avoirdupois of unslaked lime, also in powder, and thirteen and one-third pints imperial measure of distilled water. Digest them together at a moderate heat, say 120° Fahrenheit, in an earthen vessel, gently stirring this mixture with wood, until all the blue colour has disappeared. Allow the whole to stand till it is cool, and then filter it. This liquid the Patentees call ferrocyanate of lime; it should be brought, by concentration or dilution, whichever may be requisite,

to specific gravity 1,020. When at 60° Fahrenheit, ten pints imperial of this liquid is sufficient for one ton of raw sugar.

Solution No. 3. Take ten ounces, avoirdupois, of crystallised sulphate of zinc, and dissolve it in five gallons of cold water; then add five ounces, measure, of sulphuric acid, 1,845; this is sufficient for one ton of green syrups, or molasses, with or without a mixture of sugar, to which respectively this solution is to be applied, as hereinafter pointed out.

In pointing out the above quantities of the several solutions with reference to a ton, this mode is adopted for convenience, but if more or less than a ton is to be operated upon, a proportional quantity of each of the solutions required is to be used accordingly.

Mode of application, &c. One ton of raw sugar is to be mixed with the usual quantity of water; boil it in a wooden or earthen vessel in preference to metal, and remove the impurities as far as can be effected by scumming in the ordinary way, blood, or white of eggs being employed in the usual manner for that purpose; then boil this (which is called liquor), and while in a boiling state add to it the solution No. 1; bring the liquor up to boiling again, and continue this boiling a few minutes, until a peculiar and violent action in the liquid is produced, which will be immediately comprehended on trial, and then immediately throw in three pounds of pulverised chalk, and add the solution No. 2, and then stir and boil the whole for five minutes. The whole may then be filtered, evaporated for crystallisation, and completed in the usual manner to produce lumps or loaves in moulds; but the Patentees prefer, as a better mode, that the white of eggs, or bullock's blood and animal charcoal, should be used in the usual manner before filtration, after adding, and stirring,

and boiling the solution No. 2, as before pointed out. The green syrups, as they are called, which run from moulds, are to be submitted to the foregoing process, adding to them any proportion of raw sugar; but the solution No. 3 is, in this case, to be used instead of No. 1, in the above specified quantity for every ton of the syrups and sugar so mixed, and five pounds, instead of three, of pulverised chalk are to be used; but solution No. 2 will be required in the same quantity and manner as before stated. Green syrups, without any addition of raw sugar, may be subjected to this process, but they prefer the addition of sugar, as pointed out above. The green syrups remaining from the crystallisation of green syrups, as above mentioned, may also be again subjected to the patent process in like manner as the green syrups as before described, but beyond this they do not propose to repeat their operations.

With reference to syrup or cane-juice from which sugar has not been separated or made, the proportion or quantity of saccharine matter or sugar which it contains is first to be ascertained by the saccharometer or other usual means, and then it is to be treated as raw sugar, the proportions of the solution Nos. 1 and 2, and of the pulverised chalk or carbonate of lime, having reference only to the weight of saccharine matter or sugar which such syrup or juice contains. The Patentees apply their process to the working of molasses in the mode above pointed out as to green syrups.

Now, whereas the sulphate of zinc used in the solutions Nos. 1 and 3 is merely to decompose the ferrocyanate of lime; and whereas sulphuric acid has been used in the manufacture of sugar, but at a different period of the process, and for a totally different purpose than hereinbefore described; and whereas carbonate of lime has been used to neutralise the sulphuric acid, when so

used as last aforesaid, the Patentees say they use carbonate of lime or chalk also for the purpose of neutralising the sulphuric acid, and for that only; therefore they do not claim as their invention the use of chalk hereinbefore described, or any other carbonate of lime for the purpose aforesaid, neither do they claim for the use of the exact quantities before described of the solutions, nor do they claim the use of any particular compound of ferrocyanic acid, nor the particular use of the salt called sulphate of zinc, for the final removal of the ferrocyanic acid, since ferrocyanic acid, in other states than in combination with lime, and other salts than sulphate of zinc, may be used, though the process described is preferred; but they claim as their invention, first, the use of ferrocyanic acid for preventing or diminishing fermentation in the process of refining sugar, and in the process of making sugar; and, secondly, the use of sulphuric acid in the making and in the refining of sugar, for promoting and increasing that effect called crystallisation, and producing larger quantities of sugar.—[*Enrolled in the Inrolment Office, December, 1833.*]

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*To WILLIAM SHILTON, of Birmingham, in the county of Warwick, machinist, for an improved apparatus or machine for cutting files and rasps.—[Sealed April 3d, 1833.]*

This invention consists in the construction of an improved apparatus or machine for indenting and forming teeth or projections upon blank pieces of steel, for the purpose of manufacturing files and rasps, such teeth being produced upon the blanks of steel by a suitable chisel or other tool

fixed in the head of a tilt hammer mounted on an axle in the machine, which hammer is raised by projections upon a rotary tilt wheel, and is let fall with sufficient force upon the blanks of steel to effect the cuts or indentations which produce the teeth.

The blanks of steel are held in a pair of clamps in connexion with a slide, and are moved forward at intervals under the head of the tilt hammer which carries the tool; the distance which the blank is to be advanced at every movement being dependant upon the required fineness or coarseness of the cut of the file, which movement is effected and regulated by a rack and pinion, actuated by a pall and ratchet wheel, or the movement may be produced by any other convenient means.

When the machine is employed for cutting or indenting the teeth of rasps, the cutting tool being pointed and only producing one tooth at a blow, the tilt hammer carrying the tool must be made to traverse at intervals across the width of the blank piece of steel from one edge to the other and back again; the blank being advanced in length only when the hammer has produced the last cut or tooth toward either edge of the rasp.

In order to render this invention better understood, there are shown, in the several figures in Plate II., different views of two machines or apparatus, one for producing the cross cut or teeth of files, and the other for producing the cuts or teeth of rasps, both these machines being similar in their construction as far as regards the manner of effecting the blow for producing the cut; consequently, the same description will so far apply to either; but the traversing of the hammer and tool being only used in the machine for producing the teeth on the blanks for rasps, that motion not being required in the file-cutting machine, where the teeth or cuts extend at each blow across the whole

width of the blanks, we shall first describe the file-cutting machine, and then show the application of the traversing motion for the rasp-cutting machine.

Fig. 1, is an elevation of the upper part of the file-cutting machine, as seen on one side; fig. 2, is a plan or horizontal view, as the machine appears on the top; fig. 3, is another elevation of the upper part of the machine, as seen on the reverse side to fig. 1; and fig. 4, is a vertical section, taken through the machine, the moving parts being shown in the same position in all these figures.

Fig. 5, is a similar section to fig. 4, but in which the safety holders or catches are removed from under the tail of the lever of the tilt hammer; fig. 6, is another section, showing the hammer head and tool raised, and about to effect a blow or cut upon the blank piece of steel, the same letters of reference being used to mark the same parts in all these and the following figures; *a*, is the head of the tilt hammer placed in the end of the lever *b*, which is mounted on an axle *c*, turning in proper bearings in the frame work of the machine; *d*, is the tilt wheel mounted on an axle *e*, also turning in bearings on the frame work of the machine, and has any required number of projections or tappets upon it for depressing the tail or shorter end of the hammer or tilt lever *b*.

The tilt wheel *d*, receives its rotary motion from the toothed wheel *f*, mounted upon the same axle, and takes into gear with a pinion *g*, upon the main shaft *h*, which is actuated by a band passed from any first mover to the rigger on its end, or in any other convenient manner. The bed upon which the blank pieces of steel bears is marked *i*. This bed is firmly supported upon masonry placed upon proper sleepers; *j*, is one of the blank pieces of steel under operation, and is shown secured in the pair of jaws or holding clamps *k*, mounted on centre pins in the slide *l*,

which slide is held down by a spring and slide beneath, and is moved backwards and forwards in the machine upon the V edges  $m, m$ , of the frame, by means of the rack  $n$ , and pinion  $o$ , the latter being mounted upon the axle of the ratchet wheel  $p$ , and which ratchet wheel is made to turn at intervals by means of the pall  $q$ , upon the end of the lever  $r$ . This lever is depressed, after every cut has been effected upon the blank by means of the teeth or tappets of the wheel  $s$ , coming in contact with the inclined plane  $t$ , upon the lever  $r$ . The tappet wheel  $s$ , is mounted upon the end of the axle  $e$ , of the tilt wheel, and, consequently, revolves with it, and by depressing the lever  $r$ , every time that a tooth passes the inclined plane  $t$ , the click  $q$ , is made to drive the ratchet wheel  $p$ , and thereby the advancing movement of the blank is effected after each blow of the tilt hammer.

There is a strong spring  $u$ , attached to the upper side of the tilt hammer, its end being confined under an adjustable inclined plane  $v$ , mounted in the frame  $w$ , which inclined plane can be raised or lowered by its adjusting screws as required, to produce more or less tension of the spring. A similar spring  $x$ , is placed on the underside of the tilt hammer to raise it, and sustain the cutter or tool cleat of the bed after every blow, and in conjunction with safety holders or catchers  $y, y$ , (hereafter described) to counteract any vibration or tendency the spring  $u$ , may have to cause the hammer to reiterate the blow.

The end of the spring  $x$ , acts on an inclined plane  $z$ , mounted in the frame  $w$ , which has an adjusting screw similar to  $v$ , to regulate the tension of the spring.

In case the under spring  $x$ , should raise, that is, return the hammer, with sufficient force or velocity to cause the top spring  $u$ , to reiterate the blow, the ends of the safety holders or catches  $y$ , are made to move under and catch

the tail of the lever *b*, immediately on its being raised by the under springs *x*, which is effected by the following means:—The holders *y*, are mounted upon a plate or carriage 1, (seen in the sections) which turns upon a small pin or axle 2, mounted in the ears of the cross bar 3; the upper ends of the holders are kept inclined towards the tail of the tilt hammer by means of the spring 4, fixed to the cross bar 3, and acting upon one end of the plate or carriage 1.

In order that the holders *y*, may be removed out of the way of the tail of the hammer *b*, when the tilt wheel is about to effect a blow, the tooth of the tilt wheel which last acted upon the hammer comes in contact with the inclined plane 5, fixed on the plate or carriage 1, and by depressing that end of the plate, causes the upper ends of the holders *y*, to be withdrawn from under the tail of the hammer *b*, as shown in the section, fig. 5. The tilt wheel continuing to revolve, the next tooth advances, and depresses the tail of the hammer, but before it leaves the tail of the hammer, the tooth last in operation will have quitted the inclined plane 5, and allowed the spring 4, to return the holders into their former position, as shown in the section, fig. 6. After the tooth has escaped from the tail of *b*, the hammer will immediately descend and effect the blow or cut on the blank, and as the tail of the hammer rises, it will come in contact with the inclined planes at the upper ends of the holders *y*, and force them backwards; and as soon as the tail of the hammer has passed the top of the holders, the spring 4, will immediately force the holders forward under the tail of the hammer into the position shown in the section, fig. 4, and prevent the hammer rising again until the next tooth of the tilt wheel is about to depress the end of the hammer, when the same

movement of the parts will be repeated, and the machine continue in operation until a sufficient length of the blank of steel (progressively advanced under the hammer) has been operated upon, when it will be thrown out of gear by the following means:—

Upon the sliding bar 6, there is placed the adjustable stop 7, against which the foremost end of the slide *l*, comes in contact as it is moved forward by the rack and pinion *n* and *o*. The sliding bar 6, is connected at one end to the bent lever 8, the other end of this lever being formed into a forked arm, which embraces the clutch 9, upon the main shaft *i*, and as the slide *l*, continues to advance, it will come in contact with the stop 7, and when it has brought a sufficient length of the blank piece of steel under the operation of the cutting tool, the slide *l*, in its progress will have moved the stop 7, and bar 6, forward, and that bar, by means of the bent lever 8, will withdraw the clutch 9, on the main shaft, from locking into the boss of the fly wheel, and consequently stop the further progress of the machine, the rigger and fly wheel turning loosely upon the main shaft.

The now cut file can now be removed from out of the clamps, and reversed to cut the other side, or another blank piece put in its place; and after throwing back the pall *q*, of the ratchet wheel *p*, the slide *l*, and with it the fresh blank, may be moved back into the machine by turning the winch handle 10, on the axle of the ratchet wheel *p*, the reverse way, which will turn the pinion *o*, backwards, and draw back the rack *n*, without affecting any of the other parts of the machine, and on moving back the bar 6, by the handle 11, placed on the stop 7, the clutches will be thrown into gear again, and the machine proceed to cut the next blank.

When the blanks have been once cut on one side, and are reversed in the machine to form the teeth upon the other side, there should be a piece of lead placed between the blank and the bed to protect the fresh cut teeth.

It will be seen that the position of the stop 7, upon the bar 6, will determine the length or extent of the blank piece of steel which shall be cut or operated upon; and in order that the progressive movement of the blanks under the cutting tool may be made to suit different degrees of fineness or coarseness of the teeth (that is the distance of the cuts apart), there is an adjusting screw 12, upon the lever *r*, the head of which screw stops against the under-side of the ear 13, projecting from the framework, and thereby determines the extent of motion of the lever *r*, when depressed by the tappets of the wheel *s*, acting upon the inclined plane *t*, consequently determining the number of teeth the ratchet wheel *p*, shall be moved round by the pall *q*; and hence the extent of motion communicated by the rack and pinion to the slide *l*, and the blank *j*, which regulates the distance the teeth of the file are apart, and the lever *r*, is forced upwards by the spring 14, pressing against its under side.

It will be perceived that the velocity of the descent of the hammer, and consequently the force of the blow, may be regulated by raising or lowering the inclined plane *w*, of the spring *u*. And in order to accommodate the bed upon which the blank rests to the different inclinations they may be placed at, that part of the bed is formed of a semi-globular piece of hardened steel 15, which fits loosely into a similar concavity in the bed *r*, and is therefore capable of adjusting itself, so that the blanks shall be properly presented to the cutting tool, and receive the blow or cut in an equal and even manner; or the piece of steel

may be of a conical shape, and fit loosely in a similar shaped concavity.

There are guides 16, 16, placed on the top of the bed *i*, for the purpose of keeping the blanks in their proper position towards the cutting tool, and can be regulated to suit blanks of any width by turning the right and left-handed screw 17. There is also another adjustable stop 18, on the jaws or clamps *k*, which serves as a guide when placing the blanks within the jaws; and 19, is a handle or lever for raising the clamps when required, which has a weight suspended from it for the purpose of keeping down the blanks with sufficient pressure upon the bed.

The cutting tool 20, can be placed at any required angle or inclination with the blank, it being secured in the head of the hammer by the clamps and screws 21.

Having explained the different motions of the *file-cutting machine*, I shall proceed to describe the method of obtaining the traverse motion of the hammer and tool across the blanks of steel for cutting or producing the teeth of *raps*.

Fig. 7, is a side elevation of the machine; and fig. 8, is a plan view of the same, with the traverse motion adapted to it. In this machine the axle *c*, of the lever *b*, is made to slide crossways of the machine through its bearings, and according to the distance it is moved laterally with the tilt hammer and tool, will depend the distance between the teeth which extend crossways of the rasp, the progressive movement of the blank being only affected when each row of teeth across the rasp have been produced.

Upon the end of the main axle *h*, of the machine, is mounted the pinion 22. This pinion takes into a toothed wheel 23, mounted and turning loosely upon the axle of the ratchet wheel *p*. Upon the same axle, and connected to

the toothed wheel 23, is mounted the cam or step wheel 24; which cam, as it revolves, acts against a pin or stud 25, upon the end of the sliding bar 26; and as the increased diameters of the steps of the cam come in contact with the pin or stud 25, the bar 26, will be drawn towards the axle of the step wheel. Upon the sliding bar 26, is mounted the inclined plane bar 27, which bar can be adjusted to any angle to suit the desired distance between the teeth in each row crossways of the rasp, by the screw and nut 28, upon the quadrant or sector 29, the inclined plane bar turning upon a pin 30, as its fulcrum. The sliding bar 26, is mounted in bearings or guides upon a part of the framework of the machine.

At the reverse end of the axle *c*, there is a strong spring 31, which presses the end of that axle towards a piece 32, carrying a friction roller which acts against the inclined plane bar, and as the smaller diameters of the steps of the cam come in contact with the stud 25, the spring 31, will return or shift the axle *c*, and with it the lever *b*, and tilt hammer backwards across the blank, thereby producing the regular rows of teeth upon the rasp, the sliding bar 26, and the inclined plane 27, being moved backwards by the pressure of the spring 31, or in any other manner,

It will be seen that two of the steps of the cam 24, increase and diminish only half the rise and fall of the remaining portion; these two steps are for the purpose of bringing the individual teeth of each row crossways of the rasp opposite the spaces between the teeth of the preceding row; and these two steps of smaller rise and fall, come into operation only when the cross rows of teeth are finished, and when the advance motion of the blank has been effected.

There is an adjusting piece 33, placed between the end of the axle *c*, and the piece 32, which carries the anti fric-

tion roller and this piece 33, is capable of being adjusted by the screw in the piece 32, to allow of the cutting tool being regulated to form the teeth as near the edges of the blank as may be required, and which adjustment will rectify any little inaccuracy in the position of the guides for the blanks upon the bed.

The advancing motion of the blank for the rasp being only required to be effected after each cross row of teeth has been formed, the depression of the inclined plane *t*, and lever *r*, and consequently the turning of the ratchet wheel *p*, in this machine is effected by two pins, or studs, extending out from the side of the cam wheel, which come in contact with the inclined plane *t*, and produce the same effect as the tappets upon the wheel *s*, in the file cutting machine; the only difference being that the advance motion of the blank is only produced twice during one revolution of the axle. The hardened steel bed in the rasp cutting machine should be a semi cylindrical piece of steel fitting into a similar recess in the bed. The Patentee states in conclusion, that—

“Having now described my improved apparatus or machine for cutting files and rasps, it only remains for me to remark that when cutting the teeth upon fine files, I prefer using a screw in place of the rack for effecting the progressive movement of the slide *l*, and the blank piece of steel in the machine, as a screw will give a much more regular movement when the advance of the blank is required to be but little.

“This leading screw may work in a female screw upon the slide, and turn in collars at the back end of the machine, and be actuated in any convenient manner, which will be evident to all competent mechanics; and as there are many ways of effecting this movement, it will not be necessary for me to describe it further. Also, I would remark, that if

the machine could be made to work and strike the blows very regular, there would be no occasion for the steps upon the cam wheel in the rasp cutting machine, as then that wheel might be made as a double snail wheel, which would effect the regular traverses of the hammer and tool; the blows being produced at regular intervals during its rotation; and further I would remark, that the inclined plane bar might be made to produce the traversing of the hammer and tool both ways, without the aid of the spring 31, on its reverse end, as it might work in a groove on a bridle connected to the axle of the lever of the hammer, and that the machines represented in the drawings are constructed for making rasps for the use of Farriers, which have both file and rasp-cut teeth on different portions.

“And lastly, in conclusion, I wish it to be understood that I do not mean or intend to claim as my invention, any of the parts which are old, or have been before used for the like purpose; but I do claim as my invention, the improved apparatus or machine above particularly described for cutting files and rasps, and which I believe to be new, and never before been used for the same purpose.—[*Entered in the Rolls Chapel Office, October, 1833.*]

Specification drawn by Messrs. Newton and Berry.

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## SCIENTIFIC ADJUDICATION.

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### *HAWORTH v. HARDCASTLE.*

Court of Common Pleas, Guildhall; London Sittings after Michaelmas Term, 4th William IV. Before Mr. Justice Alderson.

THIS was an action to recover damages for the infringement of a patent right.

The invention which formed the subject under consideration, consisted of "certain machinery or apparatus adapted to facilitate the operation of dyeing calicoes, muslin, and other similar fabrics," for which a patent was granted to William Southworth, of Sharples, in the county of Lancaster, calico bleacher, dated 19th April, 1823, (see Vol. VIII. of our First Series, page 298,) the patent right having subsequently become the sole property of the plaintiff, Haworth.

Serjeant Wilde stated that the object of the invention constituting the subject of this patent was an apparatus to be employed in the drying house of a bleacher or dyer, for suspending long lengths of cloth, calico, or other fabric upon rods, in order that such goods might be exposed to the free action of the air, or heated atmosphere of the stove or drying room. The apparatus consisted of a carriage in which the roll of goods to be dried was conducted progressively along a sort of railway in the upper part of the drying room, the length of cloth being unwound from the roll as the carriage slowly advanced to deposit itself in loops upon the rails, placed transversely, so as to be suspended in deep folds pendent from the roof to the floor of the drying room. The use of this apparatus afforded very

great facilities and conveniences over the original practice of hanging up such goods in a drying house by hand labour alone.

The machine might be driven by the power of steam or by hand labour with a winch or handle. As it advanced upon its railway, the cylinder on which the cloth was rolled revolved, and unwound it, another roller holding the end of the cloth, and by that means letting it descend in a loop between the rails of an open flooring or horizontal rack. When a sufficient quantity of the cloth had been unwound to form one fold or loop reaching from the top to the bottom of the building, a stop was brought into operation, and the carriage was then advanced, and the cloth let down over the next rail, forming another loop in like manner; and so on until the whole length of the piece of cloth or other fabric had been suspended in loops or deep folds over the several rails of the rack or open flooring placed near the roof of the drying room.

A working model of the machine was now produced and put into operation, showing the mode by which the length of cloth is hung up to dry, and when dry is drawn off the rails and wound again on to the roller in the carriage, which will be best understood by an inspection of the specification above referred to.

For the purpose of stopping the cloth as it is unwound from the roller, and causing it to descend between the rails of the drying rack, a roller was employed in the original patent machine which pressed against the edge of each rail, and securely held the cloth there while the loop or fold descended; but by the occasional warping of the hanging rails, this stopping roller was found sometimes to fail, and in place of it falling flaps were employed to answer the same purpose.

The Patentee, after a series of misfortunes in trade, became a bankrupt; and his machinery, that is, cylinders

and other things, were sold in detached lots, by auction, to various persons in the neighbourhood, to whom rollers, &c., might be useful for a variety of other purposes. The defendant became the occupier of the premises heretofore used by the Patentee, and also obtained possession of some portions of the patent machine, not as a whole, but detached pieces, such as cylinders, frames, &c., which have been put together, and with other additions have formed a complete machine on the plan of that which is the patent right in question. He has also constructed other similar machines with some trifling colourable alteration, the employment of these machines not being under license from the Patentee, constitutes the infringement for which the present action is brought.

The alterations which have been made by the defendant partially in several machines are, first, the flap, as a stopper instead of the roller; second, driving the cylinder round on which the cloth is wound by an endless screw instead of toothed wheels; third, driving the carriage by hand labour instead of power; fourth, the stopper which, when adjusted and regulated, acted at the proper times by mechanical appendages connected to the travelling of the carriage, but, as used by the defendant, is worked by hand, the man who guides the carriage stopping the cloth when a sufficient length has descended; fifth, instead of applying the driving power to the axle of one wheel, it is, by the defendant, applied to the axle of another, both being connected by gear; sixth, as it is necessary that some power should be applied to arrest the descent of the cloth roller, instead of a board, as proposed by the Patentee for that purpose, the defendant applies a bag of shot.

The learned counsel then commented upon the slight variation between the machine as described in the specification of Southworth's patent, and those employed by the defendant, considering the latter to be but colourable

variations embracing the same principles and objects as that for which the patent was granted, and, indeed, being substantially the same invention in its most essential features.

A great number of witnesses were then called to explain the construction and use of the machine, and the models in court, as well as the fact of the defendant having used machines of nearly similar construction for the same purpose. Mr. Serjeant Wilde was assisted in the examination on the part of the plaintiff by Mr. Godson and Mr. Tomlinson ; and the cross-examination on behalf of the defendant was conducted by Sir James Scarlett, Mr. F. Pollock, Mr. Serjeant Stephen, Mr. Follett, and Mr. Cowling, which continued to a late hour at night, when Sir James Scarlett commenced the defence ; but, from the lateness of the hour, the further progress of the trial was postponed until the next day.

Sir James Scarlett considered that the plaintiff had not satisfied the jury on the essential things which go to constitute a good patent, to entitle him to a verdict. A patent, he said, must be for something original and useful. If the whole of a machine is claimed, and each particular part, and it turns out that one particular part is absolutely pernicious, then the public are deceived ; because every one who makes a machine, and adopts the useless part, is put to unnecessary expense. The learned counsel then objected to many parts of the invention, as specified, pointing out the inefficiency of the roller as a stop, and contended that as it had been proved that the machine would not answer, in all cases, for taking up or removing the goods from the rack after they had been dried, that the plaintiff should be nonsuited. That the claim of the Patentee for things which would not answer the proposed

purpose was a deception on mankind, and calculated to obstruct the progress of genius and the useful arts.

Witnesses were then called on behalf of the defendant, to prove that machines for the same purpose had been previously used in Lancashire, described their construction and mode of operating, and contended that the machines used by the defendant were much more like the old ones than like the patent machine.

The evidence being closed, and Mr. Serjeant Wilde having replied, the judge summed up, directing the jury to the consideration of the various conflicting opinions expressed on both sides, and concluded with the following remarks :—

“ Gentlemen, I do not think I can assist you further, you must be satisfied that the invention of the present Patentee is new, that it was not practised by any other persons before this. If you are satisfied that this combination of machinery is altogether new, and never before practised, then as to that find your verdict for the plaintiff.

“ You will consider whether that combination of machinery is a useful combination, and for that purpose consider upon the whole whether, previous to the existence of this patent, the public had as great a benefit as they afterwards had when this took place.

“ You will take into consideration the imperfections as they have been pointed out; but if you still think that it was a useful invention, you will upon that point find a verdict for the plaintiff. If you think that it was a new invention, and that the plaintiff had fairly specified all the invention by which the public could make the machine from this specification, you will say that this is a good specification, and then take into your consideration whether the defendant by the machines produced, called

Nos. 1, 2, 3, and 4, have infringed this patent. If you find that they have by any one of these infringed it, you will find your verdict for the plaintiff, damages one shilling.

"I have summed up with respect to all of them, because I cannot tell upon which you may find your verdict."

*Foreman of the Jury.*—Suppose we find it was not useful in a proper way for taking up?

I should be glad to hear that fact found, and if you find specially, I shall thank you to tell me; my purpose is to have it found generally, and I will reserve that point.—  
(The Jury consulted.)

*Mr. Serjeant Stephen.*—My Lord, with respect to No. 1, I think it is a question of law.

*Judge.*—So I think, but we had better not discuss it now.

*Mr. Serjeant Wilde.*—My friend is only asking your Lordship's leave to move.

*Judge.*—No, I do not give any leave, there is no dispute about the facts, but I am of opinion upon these facts.

*Foreman of the Jury.*—My Lord, we find a verdict for the plaintiff, that it is a new combination and a useful invention, but not adapted to taking up, not useful for taking up in some cases.

*Judge.*—But upon the whole, new and useful?

*Foreman.*—Yes, my Lord.

*Judge.*—Then I should recommend you, gentlemen, to find your verdict for the plaintiff.

*Foreman.*—Yes, my Lord, we do; but we do not think it useful for taking up in some cases.

*Mr. Serjeant Stephen.*—Will your Lordship give me the exact words of the finding?

*Judge.*—The Jury find that it is new and useful upon the whole, but not useful for taking up?

*Foreman.*—In all cases, my Lord.

*Judge.*—You say it is, gentlemen, useful in some cases?

*Foreman.*—Yes.

*Judge.*—Not useful for taking up in some cases; you mean, gentlemen, as to certain sorts of goods?

*Foreman.*—We mean that it is not useful for taking up, we do not qualify it.

*A Juror.*—Then we are not agreed.

*Judge*—Then you had better consult again, gentlemen.  
(The Jury consulted for a few minutes.)

*Foreman.*—We agree to let the verdict stand “in some cases,” as your Lordship took it down.

*Judge.*—Then you find it to be new and useful upon the whole; sufficient for a mechanic to make it by, and that there has been an infringement, but you find that it is not useful in some cases for taking up the cloth?

*Foreman.*—Yes, my Lord.

*Judge.*—Then, gentlemen, your verdict shall be for the plaintiff—damages one shilling.

*Mr. Serjeant Wilde.*—I do not know the Court of Chancery will compensate us; I do not know whether it is necessary to have any compensation here.

*Judge.*—Gentlemen, will you tell us whether you think Nos. 1, 2, 3, and 4, are infringements?

*Foreman.*—We have nothing before us about No. 4.

*Judge.*—Then, do you think that Nos. 1, 2, and 3, are infringements?

*Foreman.*—Yes, we do, my Lord.

*Judge.*—Then you are at liberty to move, if the Court of Common Pleas are of opinion that the true effect of the specification is to claim the staves (rails for drying), then you are at liberty to enter a nonsuit; or, if the last question of the Jury vitiates the patent, how shall I identify them?

*Mr. Serjeant Wilde.*—By the numbers as they have been spoken of, my Lord.

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**New Patents**

**S E A L E D I N E N G L A N D,**

1834.

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To Thomas Sharp, of Manchester, in the county palatine of Lancaster, and Richard Roberts, of the same place, engineers, for certain improvements in machinery for grinding corn and other materials, being a communication from a foreigner residing abroad.—Sealed January 1st—6 months for enrolment.

To Joshua Taylor Beale, of 11, Church Lane, Whitechapel, in the county of Middlesex, engineer, for his invention of a lamp, applicable to the burning of substances not hitherto usually burned in such vessels or apparatus.—Sealed January 4th—6 months for enrolment.

To Frederick Plant, of Bread Street Hill, in the city of London, fur catter, for his invention of an improved fur cutting machine.—Sealed January 13th—2 months for enrolment.

To Pennock Tigar, of Grove Hill, in the parish of Saint Nicholas, in the liberties of Beverley, in the county of York, merchant, for his invention of certain improvements in the construction and arrangement of iron or other metal wheels for carriages.—Sealed January 13th—6 months for enrolment.

To Joshua Bates, of Bishopsgate-street, in the city of London, merchant, for an improved method of condensing aeriform substances and refrigerating fluids, being a communication from a foreigner residing abroad.—Sealed January 13th—4 months for enrolment.

To James Walton, of Sowerby Bridge, in the county of York, cloth dresser, for his invention of improvements in

machinery for facilitating the operations of raising, dressing, and cropping the pile of woollen and some other fabrics.—Sealed January 14th—4 months for enrolment.

To Charles Attwood, of Wickham, near Gateshead, in the county of Durham, manufacturer of soda, for his invention of the art of making a certain pigment or certain pigments by a certain process or certain processes not previously used for such purpose or purposes.—Sealed January 16th—6 months for enrolment.

To James Boynton, of High Holborn, in the county of Middlesex, portable inkstand manufacturer, for his invention of improvements in apparatus or means of producing light.—Sealed January 18th—6 months for enrolment.

To William Morgan, of Penton Row, Walworth, in the county of Surrey, plumber and glazier, for an apparatus for heating and ventilating churches, conservatories, houses, and other buildings or places.—Sealed January 18th—6 months for enrolment.

To Jean Jacques Leopold Oberlin, of Leicester-square, in the county of Middlesex, merchant, for improvements on, or additions to boilers, applicable to various purposes, being a communication from a foreigner residing abroad.—Sealed January 18th—6 months for enrolment.

To Ernst Wolff, late of Leeds, in the county of York, but now of Stamford-hill, in the county of Middlesex, gentleman, for certain improved means of supplying heated air, in order to support combustion in enclosed fire-places, being a communication from a foreigner residing abroad.—Sealed January 23d—6 months for enrolment.

To William Thomas Yates, of John-street, Cambridge-heath, in the county of Middlesex, engineer, for his invention of certain improvements in boilers for steam engines, and other uses.—Sealed January 23d—6 months for enrolment.

## CELESTIAL PHENOMENA, FOR FEBRUARY, 1894.

D.	H.	M.	D.	H.	M.	
1	Clock before the	○ 13m. 54s.	15	○	passes the mer. 5h. 7 m.	
—	○	passes the mer. 19h. 0m.	6	7	μ's second sat. will emerge.	
4	26	Sag. Occul. im. 17h. 26m. em.	7	♀	in conj. with ♂ in Capri, diff. of dec. 1. 24. 8.	
		18h. 0m.	23	12	Ceres in opposition ○	
5	Clock before the	○ 14m. 19s.	16	1	3	♀ in conj. with ♂ diff. of dec. 0. 36. N.
—	○	passes the mer. 22h. 31m.	9	41	○ in □ or first quarter.	
10	55	μ's first sat. will emerge.	19	7	♀ in conj. with ♀ in Aquarii, diff. of dec. 0. 48. S. 0	
5	17	20	—	Venus passes the mer. n on.		
7	12	58	—	Mars passes the mer. 22h. 10 m.		
7	19	39	—	Mer. passes the mer. Uh. 35m.		
8	5	1	—	Jup. passes the mer. 4h. 2m.		
8	8	37	—	Sat. passes the mer. 14h. 49m.		
		38	—	Georg. passes the mer. 23h. 43m.		
10	Clock before the	○ 14m. 33s	20	Clock before the	○ 14 m. 3	
—	○	passes the mer. 1h. 40m.	—	○	passes the mer. 9 h. 20 m.	
—	Mer. R. A. 21 h. 28 m. dec.	—	—	Mer. R. A. 22 h. 38 m. dec.		
	17. 6. S.	10. 15. S.				
—	Ven. R. A. 21h. 11 m. dec.	—	—	Ven. R. A. 22 h. 1 m. dec.		
	17. 24. S.	13. 34. S.				
—	Mars R. A. 19 h. 37 m. dec.	—	—	Mars R. A. 20 h. 9 m. dec.		
	22. 20. S.	21. 5. S.				
—	Vesta R. A. 22 h. 54 m. dec.	—	—	Vesta R. A. 23 h. 15 m. dec.		
	12. 3. S.	10. 0. S.				
—	Juno R. A. 18 h. 38 m. dec.	—	—	Juno R. A. 18 h. 50 m. dec.		
	12. 25. S.	11. 48. S.				
—	Pallas R. A. 8 h. 39 m. dec.	—	—	Pallas R. A. 8 h. 33 m. dec.		
	19. 30. S.	15. 31. S.				
—	Ceres R. A. 10 h. 27 m. dec.	—	—	Ceres R. A. 10 h. 17 m. dec.		
	26. 27. N.	27. 48. N.				
—	Jup. R. A. 1 h. 58 m. dec.	—	—	Jup. R. A. 1 h. 59 m. dec.		
	10. 27. N.	11. 3. N.				
—	Sat. R. A. 12 h. 42 m. dec.	—	—	Sat. R. A. 12 h. 41 m. dec.		
	1. 44. S.	1. 39 S.				
—	Georg. R. A. 21 h. 40 m. dec.	—	—	Georg. R. A. 21 h. 42 m. dec.		
	14. 41. S.	14. 30. S.				
20	6	♀ greatest hel. lat. S.	21	9	18	μ's first sat. will emerge.
	Occul. r	Piscium im. 6h. 55m.	23	9	0	Ecliptic oppo. or ○ full moon
		em. 7h. 31m.		—	Occul. v. Virginis, im. 10 h.	
11	4	54			15m. em. 11h. 7m.	
11	—	μ in conj. with ○	24	1	0	○ in perigee.
18	16	○ in apogee.	25	Clock before the	○ 13m. 22s.	
18	16	♀ in aphelion.	—	○	passes the mer. 14h. 19m.	
22	—	♀ in conj. with ♂ diff. of	14	8	μ in conj. with the ○ diff. of	
		dec. 1. 25. 8.			dec. 2. 37. S.	
13	0	58	26	—	Occul. r 3. Virginis im. 9h.	
21	—	♀ in sup. conj. with ○			29m. em. 10h. 24m.	
		♀ in conj. with γ in ν diff.	27	13	0	μ in conj. with μ in Capri, diff. of dec. 0. 2. S.
14	1	13				
7	20	μ's first sat. will emerge.				
15	Clock before the	○ 14 m. 27s.				

## METEOROLOGICAL JOURNAL,

FOR DECEMBER, 1833, AND JANUARY, 1834.

1833.	Thermo.		Barometer.		Rain in in- ches.	1834.	Thermo.		Barometer.		Rain in in- ches.
	Hig.	Low	Hig.	Low.			Hig.	Low	Hig.	Low.	
Dec.						Jan.					
26	50	34	30,06	29,93	,075	11	49	36	29,38	29,26	,15
27	50	39	29,85	29,69	,025	12	47	39	29,16	29,08	,075
28	47	40	29,82	29,70	,25	13	47	36	29,38	29,30	,175
29	45	36	29,86	29,76		14	51	37	29,34	29,30	,075
30	52	38	29,63	29,60	,025	15	50	35	29,41	29,28	,1
31	54	45	29,58	29,56	,1	16	49	39	29,59	29,56	,175
1834.						Jan.					
Jan.						17	51	44	29,87	29,30	,2
1	47	36	29,89	29,72	,075	18	49	41	29,61	29,40	,275
2	42	34	30,26	30,11		19	45	39	29,63	29,53	
3	49	36	29,95	29,80	,025	20	48	34	29,92	29,64	
4	49	39	29,91	29,81	,025	21	52	45	29,82	29,69	
5	50	36	29,92	29,83		22	50	43	29,69	29,59	
6	51	39	29,76	29,46		23	55	44	29,80	29,74	,275
7	47	35	29,52	29,50	,15	24	53	46	29,97	29,88	,15
8	46	36	29,25	29,21	,075	25	51	45	30,11	30,05	
9	43	38	29,38	29,23	,5						
10	43	37	29,06	29,04	,15						

Edmonton.

CHARLES HENRY ADAMS.

Latitude 51° 37' 32" N.

Longitude 3 51' West of Greenwich.

THE  
**London**  
**JOURNAL OF ARTS AND SCIENCES.**  
AND  
**REPERTORY**  
OF  
**PATENT INVENTIONS.**

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*CONJOINED SERIES.*

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No. XXIII.

**Recent Patents.**



*To JOHN KITCHEN, of the town and county of the town of Newcastle-upon-Tyne, printer, for his invention of certain improvements in printing presses.—[Sealed 25th July, 1833.]*

THIS invention of improvements in printing presses consists in a novel arrangement of the several parts and appendages of a machine for printing from types or blocks, or other surfaces in relief, as in the operation of letter-press printing; in which novel arrangement the table or surface upon or against which the form of types, blocks, or other surfaces are to rest, is placed in a perpendicular position,

and the situation of the form of types, blocks, or other surfaces is adjusted by means of racks and pinions. The form of type is inked, or the colour supplied to the printing surface, by conducting an elastic roller up and down in perpendicular directions in front of the form by means of guides and pulleys. The platten or pressing surface, with the tympan and frisket holding the sheet of paper about to be printed, is brought in contact with the table and form by means of vibrating arms moving upon pivots which carry the platten, bringing it up to the table and form when the impression is about to be given, and allowing it to fall back for the removal of the sheet when printed, and for the supply of a fresh sheet.

The power for giving the pressure is obtained and applied by means of jointed levers actuated by a crank and rod, as will be seen by reference to the several figures in Plate III., similar letters and numbers being used to point out and refer to corresponding parts of the machine in all the figures. Fig. 1, is a front elevation of the improved machine; fig. 2, is a plan or horizontal section of the lower parts of the machine; fig. 3, is a longitudinal section of the machine taken in the same position as fig. 1; and fig. 4, is an end elevation thereof.

A frame of cast iron or other suitable material consisting of four angular columns A, A, standing upon a base B, B, encloses the whole of the machinery. A thick plate of iron C, C, with strong ribs or braces behind to give it stability, constitutes the table for the form of types. This table is placed in a vertical position, and is made fast to the frame, as shown in figs. 3 and 4. The attachment is formed by screw bolts passed through slotted holes in the columns of the frame, and any small adjustment required may be obtained by wedges z, z, z, shown in fig. 3. Against the face of the table C, the chase or frame hold-

ing the form of types or other printing surfaces is secured by screwed champs *a, a*, shown in fig. 5 and fig. 6, attached to sliding adjustable racks *b*, which racks are capable of being moved up or down in slots in the table by pinions affixed to the shaft *c*, extending across the back of the table, as shown in fig. 3 and fig. 4.

The platten is a thick plate of iron *D*, mounted upon vibrating arms or bent levers *E, E*, which turn upon pivots *d*, below, as shown in fig. 3. The face of this platten is to be covered with a blanket or felt, and a light frame of iron carrying the parchment or canvas tympan is let into a groove round the face of the platten near its edges, and is made fast to the platten by thumb screws *f*, which draw the tympan tight and smooth over the surface, and thereby prevent its bagging. The frisket *h*, is also a light frame of iron attached to the platten by jointed levers *i* and *g*, as represented in fig. 1, and when closed, this frisket or light frame lies round the outside or edge of the platten. To the back of the platten the pressing levers are attached by joints.

These pressing levers consist of a rod or lever *F*, connected at one end with the platten by a pin *k*, and at the other end with the two rods or levers *G, H*, by a pin *l*, which together form what is commonly called a toggle joint. The lever *G*, turns upon a strong shaft *m*, as its fulcrum, which shaft is mounted in the columns of the frame by inserting its ends into sliding blocks *n*, capable of adjustment so as to vary the pressure or power of the toggle joints by raising or lowering the wedges *o*, worked by screws above, and a balance weight is placed upon the outer extremity of the lever *G*. The lever *H*, is a crank rod attached by a pivot *p*, to the side of the large wheel *I*, by the rotation of which wheel the rod *H*, is brought up for the purpose of forcing the levers *F* and *G*, into hori-

zontal positions when the pressure is to be given. The wheel I, is driven by a pinion K, upon the shaft J, which shaft is actuated by a winch or handle and fly wheel L, as shown best in the horizontal view fig. 2. This corresponds with the usual operation of the rounce in the ordinary presses, in which the table and form of types move to and fro in horizontal directions; and motion may also be given to this machine by a rigger fixed on the shaft J, and a band from a steam engine. The inking rollers or apparatus by which the ink or colour is given to the face of the types or printing surfaces previous to every impression, are shown best in the section fig. 3.

In this figure, M, represents a box extending across the machine, the upper part of which is a trough containing the printing ink, and in this trough partly immersed in the ink is a roller N, of iron or other metal, called the ductor roller. This roller is made to revolve in the ink trough by means of a pulley and three grooves upon the end of its axle, which is driven by a cord or band extending from a sheave with three grooves fixed upon the axle of the large wheel I, as shown in fig. 2. A slip of metal is placed along the front of the trough for the purpose of scraping off any superfluous ink from the surface of the ductor roller as it revolves, and the box below may be filled with hot or cold water to regulate the temperature of the ink in the trough. Above the ductor is another roller O, made of elastic materials, for carrying or communicating the ink from the ductor to the distributing roller P, next above it.

The axle of the carrying roller O, is mounted upon a vibrating lever s, shown by dots in fig. 3; at the opposite end of which lever there is a preponderating weight, for the purpose of keeping the roller O, raised up from the ductor, excepting at such times as the platten D, and its arms E, are brought into the pressing position shown in

fig. 3, when the end of a screw or pin *r*, attached to the vibrating arm *E*, strikes upon a perpendicular arm *t*, extending at right angles from the lever *s*, shown also by dots, which forces the arm forward, and causes the roller *O*, to come down into contact with the ductor, and, being then turned by the friction of contact, to receive its supply of ink as they revolve.

The distributing roller *P*, is of wood, and receives the ink from the carrier roller on the retiring of the arm *E*, which allows the lever with the roller *O*, to rise and bring that roller into contact with *P*. The roller *P*, has a pulley on the end of its axle, and is made to revolve by a band or cord leading from a sheave on the principal driving shaft *J*, as shown at *v*, in fig. 2; and in addition to its rotary motion this roller *P*, is made to slide to and fro by any of the ordinary contrivances, for the purposes of producing a more uniform distribution or spreading of the ink over its entire surface. Above the distributing roller is the flexible feeding roller *Q*, which is always in contact with *P*, and therefore on the distributing roller receiving ink as it revolves, it delivers that ink on to the flexible surface of the feeding roller above, and this also communicates its ink to the inking roller *R*, whenever the two last mentioned rollers come in contact. The manner in which the inking roller *R*, is made to pass up and down against the face of the form of types is the subject next to be described.

The ends of the axle of the inking roller *R*, turn in small boxes *S*, shown in fig. 1, which slide up and down upon perpendicular guide rods *T*. A cord *U*, is attached to each of these sliding boxes, and which cords pass upwards and over pulleys *V*, *V*, at the top of the frame of the machine, (see fig. 3,) and then downwards to pulleys *W*, *W*, on the auxiliary shaft *X*: this auxiliary shaft is

driven by a toothed wheel Y, on the main shaft J, which wheel takes into a similar toothed wheel Z, on the auxiliary shaft: the last mentioned wheel slides loosely round the shaft, and therefore can only give rotary motion thereto when the wheel and the shaft are locked together by the clutch box w. This clutch box may be slidden to and fro at certain periods of the evolutions of the machinery by any of the ordinary contrivances applied to a similar purpose. The Patentee employs two tappets extending from the axle p, of the large wheel I, which, as the axle goes round, act alternately upon a tumbler lever x, connected with the clutch box, and slide the clutch to and fro at intervals, thereby locking the wheel Z, and axle X, together, or unlocking them, as may be required.

Having described the construction of this improved printing press, we proceed to explain its mode of operation. The form of types being placed vertically against the table in the frame, as described, and the platten D, thrown back, as in fig. 1, the pressman proceeds to lay and adjust the sheet of paper on the tympan upon the face of the platten, and then to close the frisket, in order to confine the sheet, which is done by depressing the handle of a right-angled lever g, turning upon a pivot at the lower part of the platten: this, with the assistance of another guide lever, brings the frisket frame on to the face of the tympan. The types having been previously inked, the pressman now applies his hand to the winch or handle of the fly wheel L, on the main shaft J, and by turning it, brings the wheel I, with the crank rod H, into the position shown in fig. 3, which is the period of the operation when the levers F and G are brought into horizontal coincidence, and the platten carrying the sheet to be printed is pressed with great force against the form of types to obtain the impression. The further rotation of the shaft J, brings the levers again into

the situation shown in fig. 1, the platten being thrown back; the frisket frame is then opened and the printed sheet removed, a blank sheet being placed in the same situation as before ready for the next operation.

While the platten is falling back into the position shown in fig. 1, one of the tappets upon the axle *p*, comes in contact with the tumbler lever *x*, and throws it into that position which locks the wheel and the auxiliary shaft *X*, together. This shaft, in consequence, is now made to revolve, and the pulleys *W*, *W*, to wind up the cords *u*, connected with the carriages *S*, of the inking roller *R*, which cause these carriages and the inking roller to be carried upon the perpendicular guide rods *T*, and the peripheries of the roller being in contact with the face of the types, the ink is communicated thereto by this operation.

On the other tappet striking the tumbler lever *x*, it is thrown over in the opposite direction, and the clutch *w*, being thereby suddenly back, the shaft *X* is unlocked from the wheel *Z*. The weight of the inking roller and its carriages now operating upon the loose axle or auxiliary shaft *X*, draws it round, unwinding the cords from the pulley *W*, and allowing the roller *R*, to descend by its gravity into the situation shown in fig. 3, there to be again supplied with ink. But in order to prevent the roller *R*, descending too rapidly, a flier *y*, is connected with one of the pulleys, which, by the resistance of the air as it revolves, retards the rotation of the pulley, and thereby enables the roller to descend gradually.

The principal features of advantage which the Patentee conceives to belong to this improved printing press are the compact positions of all its parts, occupying but a comparatively small space of room, yet possessing sufficient area for printing the largest sheets of paper, and giving out an immense power by the exertion of a slight degree

of labour. By fixing the form vertically, the accidental falling out of the types will be prevented, and the sheets of paper, by the position of the platten and frisket, are brought to the types by the least possible extent of movement.

The Patentee states in conclusion, "I wish it to be understood that I claim as my invention in connexion with a printing press, first, the placing of the form of types or other printing surfaces in a vertical position; secondly, the manner in which pressure is applied by the compound levers in combination with the large crank wheel and its pinion; thirdly, the manner of throwing the frisket back from the platten into an inclined position; fourthly, the surrounding of the ink trough or duct with hot or cold fluid, for regulating the temperature of the printing ink; fifthly, the adaptation of a retarding apparatus to partially balance the descent of the inking roller; and sixthly, the general arrangement of the whole of the machinery in the way described above."—[*Inrolled in the Rolls Chapel Office, February, 1834.*]

Specification drawn by Messrs. Newton and Berry.

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The compactness and simplicity of this machine exceeds any that we have previously seen for printing letter-press. It occupies only a space of four feet six inches, by three feet six, in its horizontal area, and is seven feet six inches in height; none of its parts or appendages throwing out beyond those dimensions. The machine inks itself, and by the labour of one man to lay on the sheet and a boy to take off, five hundred of the largest newspapers may be struck off with ease in the space of one hour. If driven by the power of steam, six hundred impressions may be obtained by one man laying on and taking off the sheets.

The entire weight of the machine, in its largest construction, does not exceed one ton and a half, and its cost is about 150*l.* We have seen one of these presses in operation, which for the last four months has been employed, beside other works, in printing the *Newcastle Journal*; and another, on the same construction, is, we learn, printing a very large newspaper at Bradford, in Yorkshire.

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*To JOSHUA BATES, of Bishopsgate-street, in the city of London, merchant, for certain improvements in machinery or apparatus for cleaning and combing wool or such other fibrous substances, being a communication from a foreigner residing abroad.—[Sealed 13th August, 1833.]*

THESE improvements in machinery or apparatus for cleaning and combing wool or such other fibrous substances, consist in an improved arrangement and construction of machinery or apparatus by means of which the burrs or seeds of wild plants, small pieces of vegetable matter, dirt, or other foreign material, mixed or mingled with certain descriptions of wool, can be removed therefrom, and at the same time the fibres of the wool are partially combed or laid straight, and the sliver or layer of wool elongated, and which machinery or apparatus is more particularly applicable to cleaning and combing of South American wool, or wool from other countries, where the flocks of sheep are allowed to range in a wild state during certain periods of the year in the forests or uncleared lands, whereby the burrs or seeds of plants or other foreign material which adhere to the fleece of the sheep become so

entangled and intermingled with the wool as it grows, that it requires considerable trouble to clean the wool therefrom after the shearing.

In this improved machinery or apparatus, the wool, or other fibrous substances to be operated upon, is placed upon a feeding cloth, and drawn from thence between two or more plain or fluted rollers, and is presented from them to the action of a toothed cylinder in a gradual and nearly uniform and regular manner.

The wool, in its progress through the machine, is drawn or made to pass from these rollers upon, against, or in contact with a revolving, ribbed, or toothed cylinder or cylinders, rollers and bands, one or more of such cylinders being supplied or armed with projecting teeth, by means of which the wool (while being passed from one set of rollers to the next) is elongated or drawn into a thinner sheet or layer, and the fibres at the same time in some degree combed or straightened and laid parallel to each other, while the burrs or other foreign material intermixed with the wool are loosened and presented on the surface of the sheet or sliver, and at the same time the wool is in some degree cleansed from such burrs and other foreign material, as well as from knobs and snarls.

From the toothed cylinder or cylinders the wool is drawn on to and between or against two or more other drawing rollers connected with a band or apron, so that the wool, while in its further progress through the machine by the comparative velocity in the revolution of the latter drawing rollers and the first set, receives a further elongation, and becomes a still thinner sheet or layer, and the fibres of the wool are further straightened or laid parallel with each other, and at the same time the sliver of material operated upon is drawn and tightly held round one or more of the

drawing rollers, the ends of the fibres being held or confined between them. By this process the burrs and other foreign material commingled with the wool are loosened and presented on the surface of the sheet or sliver in such a manner as to be easily detached and taken off by scraping, brushing, striking, blowing, &c., the wool being tightly held in its progress of passing through the rollers with the belt or apron connected therewith.

While the wool or such like substance is being tightly held by the rollers, and is in the process of passing, as above described, the burrs, seeds, or other foreign material are cleared and removed from off the surface of the sliver by means of a scraper or brush, or other agent, which revolves against or otherwise acts upon the surface of the sliver of material, and removes the burrs from the wool ; and after the burrs and other foreign material are removed from the sliver, it is carried or conducted to a receiving cylinder, or may be otherwise taken away, and will be in a better condition for any subsequent process or operation of manufacturing.

Having described the general features of this improved machinery or apparatus for cleaning or combing wool and such other fibrous substances, the Patentee proceeds to describe more particularly the arrangement and construction of the same, as shown in the several figures of one of these improved machines which accompany the Specification, part of which are shown in Plate III. Fig. 7, is a side elevation ; fig. 8, is a vertical section taken longitudinally through the machine for the purpose of showing more particularly the progress and passage of the sliver of wool, or such other material under operation ; and fig. 9, is a section taken through the operative portion of the machine, and drawn on a larger scale the better to show the parts : *a, a*, is the framework or standards of the machine, which

is made of sufficient width and length to receive at one time a whole fleece of wool; *b*, is the endless web or feeding cloth upon which the wool to be operated upon is placed and spread even. This endless cloth is made of canvas or any other suitable material, and passes around the end roller *c*, and the lower of the first set of feeding rollers *d*, *d*, which may be varied in size according to the state of the wool, and more than two of them may be used if thought necessary. The upper roller is ribbed or grooved in order that the burrs or other foreign materials may not be broken or flattened down into the wool by passing between them, and also that the wool may be retarded and conveyed more gradually to the toothed cylinder *e*, which is about six inches in diameter, and has its periphery supplied or armed with teeth projecting from the surface about half an inch. These teeth are from one-sixteenth to one-eighth of an inch in diameter, pointed, and bent something in the shape of the letter S, and are set in the cylinder about a quarter of an inch apart; but these particulars will in some instances require to be varied according to the state of the wool intended to be operated upon. The cylinder *e*, is situated on the opposite side of the feeding rollers *d*, to that where the wool enters between them, and is placed so near them that the teeth of the cylinder may take or strike into the wool as near the pinch of the drawing rollers *d*, as possible: *g*, *g*, *g*, and *h* 1, *h* 2, are the second set of drawing rollers connected with a band or apron *i*, and by which they are made to revolve, the elasticity of the belt or apron *i*, allowing them to recede more or less on the passage of any extraordinary quantity of burrs or other foreign material through them. The drawing rollers *g*, are about one inch and a half in diameter, but may be varied in size as well as in their arrangement and number, they receiving their rotary motion through

the shaft *k*, which is connected to them by suitable toothed pinions.

The endless belt or apron *i*, is made of canvas or any other suitable material, and passes nearly around the rollers *h* 1, and *h* 2, and among the set of drawing rollers *g*; a thin plate or piece of metal *l*, (called a preventor,) is placed, so that one edge of it is parallel to the surface of the drawing roller *h*, *h*; it may be made from one to two inches in width, and extending the length of the rollers; the edge or under side of this preventor, which is in contact with the apron *i*, is filed down to a blunt edge, while the other edge or back is fixed to a piece of iron, for the purpose of giving it firmness and stability. This preventor may be placed stationary in the position in which it is intended to operate, or it may be fixed upon an arm turning upon centres as shown in the drawings, by which means it can be readily thrown back into the position shown by the dotted lines in fig. 9; *m*, is a beater, brusher, or scraper, which may be made of wood, iron, or any other suitable material, and consists of a cylinder with projecting wings or ribs, the outward edges of which are filed rough, or toothed transversely with its axis, and form alternate angles with the same. This beater is placed as near to the blunt edge of the preventor as possible, and so that the projections or wings, as it revolves rapidly, may come in contact with the burrs, pieces of vegetable material, dirt, or other foreign matters, and remove them from the surface of the sliver of wool without injuring the fibre of the same; *n*, is an adjustable rod, which carries the axis of the belt or apron roller *o*; at the upper end of this rod there is a screw and nut for adjusting the tension of the apron; *p*, is a guide for keeping it in its proper place upon the roller; *q*, is the cylinder intended to receive the sliver of the wool as delivered from the apron, and which will

descend from the rollers *g*, in a thin sheet or layer. The machine is put in motion by a band leading from any first mover to a rigger upon the axis *r*, and upon this axis is mounted the pulley *s*, around which a band passes and communicates motion to another pulley *t*, on the end of the shaft of the beater or brusher; *u*, is another driving pulley upon the axis *r*, around which a band passes and communicates motion to the pulley *v*, on the shaft *k*, which is furnished with suitable gearing for driving the other parts of the machinery.

Having set forth the construction and arrangement of one of these improved machines, we shall proceed to describe its operation. The wool is placed evenly in its uncleanned state upon the endless feeding cloth *b*, from whence it passes between the feeding rollers *d*, in a gradual manner, and is then acted upon by the teeth of the cylinder *e*, which is of larger diameter than the rollers, and revolves at a greater speed so as to carry the points of the teeth with a velocity four or five times as quick as that of the feeding rollers, consequently the wool, being held back by the rollers, is combed by the teeth, and drawn into a layer or sliver thinner than that delivered from the feeding rollers, and at the same time the fibres of the wool are straightened and made more parallel to each other, at the same time the burrs, &c. are loosened without being crushed or broken, and presented on to the surface of the sliver, and the wool itself is by this operation in a degree combed and cleared from snarls and knots.

The next operation upon the wool takes place while it is passing over the small roller *h* 2; the belt or apron *i*, receives the wool from the toothed cylinder *e*; the drawing rollers *g*, and *h*, are made to revolve with greater rapidity than the cylinder *e*, whereby the wool is further elongated into a thinner sheet or layer, and the fibres retained

parallel to each other, or rendered more so also by the arrangement of the second set of drawing rollers, together with the thinness of the sheet or layer and the bending and pinching of the wool, the burrs, seeds, dirt, or other matter, are brought principally on to the surface of the sliver, and in a loosened state, so as to be easily taken or brushed off, while by the elasticity of the belt or apron *i*, they are allowed to pass through the drawing rollers without being materially broken.

The wool being drawn into a thin sheet or layer, with its fibres straightened or laid parallel to each other, and held tightly round the outward drawing roller *h 2*, having the burrs presented principally on the surface in a loosened state, it is ready for the next operation, viz. to remove them from the same. This is done by means of the preventor *l*, and the beater or brusher *m*; the blunt edge of the preventor presses on the wool while it is tightly held on the small drawing roller *h 2*, and receives the burrs and other extraneous matter as the wool is passing under it, while the beater *m*, revolving with great rapidity, acts upon the burrs as they are raised by the preventor, and takes them off over the blunt edge of the same: the wool being now clear from burrs, passes on to the cylinder *q*, or it may be taken off by hand or otherwise.

Having described the nature and operation of this improved machine or apparatus for cleaning wool and such other substances, the Patentee concludes his Specification by the following remarks:—" It will be evident, the size, diameter, and number of the various rollers and cylinders, as well as the velocity with which they are made to revolve, may be varied to suit different kinds of wool which the machine may be required to operate upon, and that in the place of the beater or brusher described above, for removing the burrs or other foreign matter from the surface

of the wool, a brush formed of wire, bristles, or other materials may be used, and also that a current of air might be made to blow upon the surface of the wool at this part of the operation with good effect, as it would assist the operation of clearing the wool from dust as well as burrs, and which current of air might be supplied from any convenient blowing apparatus, and conducted to the part of the machine desired.

“ Having now described the arrangement, construction, and operation of this improved machinery or apparatus for cleaning and combing wool or such other fibrous substances, I wish it to be understood that I do not mean or intend to claim a part of this invention any of the parts herein described separate or which may have been heretofore used for the like purpose; neither do I intend to confine myself to any precise dimensions herein specified, or to the number of the rollers, cylinders, or other parts, which may be varied to suit the different state and kinds of wool to be operated upon; but I do claim as the improvement under the above in part recited Letters Patent the machinery or apparatus above described for detaching and separating from wool, or other such substances, burrs, seeds of plants, pieces of vegetable matter, dirt, or other foreign material, and which is effected by extending and straightening the fibres of the wool, &c., in such a manner as to bring the burrs or other extraneous matter wholly or principally on to the surface of the wool or other material, and then removing the same by beating, brushing, striking, or blowing them off, as herein described.”—[*Inrolled in the Rolls Chapel Office, February, 1834.*]

Specification drawn by Messrs. Newton and Berry.

*To WILLIAM NORVELL, of the town and county of Newcastle-upon-Tyne, engineer, for an improvement of the machinery now in use for making strands from the yarns, and laying ropes by such machinery at one and the same time.—[Sealed 8th May, 1833.]*

THE subject of this Patent is an improvement adapted to the ordinary machinery employed for twisting hempen yarns into strands, affording a simple and more eligible mode of accomplishing that object, and also of laying the strands together, than has been heretofore effected by any other machinery.

The fibres of hemp having been previously twisted or spun into yarns, these yarns are wound upon bobbins, and the bobbins are mounted on axles and hung in the frame of the machine, as shown in the elevation, Plate III. fig. 10, from which bobbins the several ends of yarn are passed upwards to and through inclined tubes; and by the rotation of these tubes, and also of the carriages in which the bobbins are suspended, the yarns become twisted into strands, and also the strands are laid and form ropes, in the manner described by the Patentee in the following words:—

“My improvements consist, firstly, in the application of three or more tubes, two of which are represented in elevation at fig. 10, placed in angular positions so as to receive the strands immediately above the press block *a, a*, and nearly in a line with *A*, the point of closing or laying the rope. *B 1*, and *B 3*, are opposite side views, *B 2*, an edge view, and *B*, a side section of the same. I do not claim any exclusive right of patent for the tubes themselves, only for their form and angular position.

“Secondly, in attaching two common flat sheaves or

pulleys *c, c*, fig. 10, to each of the said tubes, nearly round which each strand is lapped or coiled to prevent them from slipping, as shown in the section B 1. The said sheaves or pulleys are connected by a crown or centre wheel *D*, loose upon *b, b*, the main or upright axle *E, E*, a smaller wheel upon each tube, working into the said crown or centre wheel, and fixed upon a loose box *I*, on each of the said tubes.

“ *F, F*, a toothed or spur wheel, fixed also upon each of the said loose boxes *I*, and working into a lesser wheel *G*, upon the axis *2*, of each tube; *H*, a bevelled wheel fixed upon the same axis with *G*, and working into another bevelled wheel *j*, fixed upon the cross axle *3*, of each tube; *K*, a spur wheel attached to the same axis with *j*, at the opposite end, and working into *L*, another spur wheel of the same size upon each of the said tubes. By wheels thus arranged and connected with the said sheaves or pulleys, as above described, a perfectly equal strain or tension is put upon each strand as drawn forward over the pulley *c*.

“ I do not claim the manner in which the sheaves are connected as my invention, only their application to the tubes in their angular position.

“ Thirdly, my invention consists in the introduction of change wheels *M, M, M, M*, shown at fig. 10, for putting the forehand or proper twist into each strand before the rope is laid; this I effect by small spindles on axles *4, 4*, placed parallel with the line of each tube *B*.

“ Upon the lower end of each spindle the bevel wheels *N, N*, are attached and driven by other bevelled wheels *O, O*, fixed immediately above each press block *a, a*. On the top end of each said spindle or axle *4, 4*, is attached one of the change wheels working into the other change wheel fixed upon the bottom end of each of the said tubes, whereby the forehand or proper twist in the strands for all sizes of

ropes is at once attained by simply changing the sizes of those two last described wheels, which can be very readily effected from the manner in which they are attached to the tubes B, B, and 4, 4.

“ From the angular position of the tubes towards the centre the strands are nearly in contact at their upper ends, where the rope is laid, and immediately below which the forehand or proper twist is given to the strands.

“ Fourthly, in the application of a press block P, in two parts, of metal, placed directly above and close down to where the rope is laid at A, the inside of which is polished, and the under end bell-mouthed, to prevent the rope from being chafed in entering it, a sufficient grip or pressure is put upon the rope by one or two levers and weights 5, 5, acting upon the press block so as to adjust any trifling irregularity in the strands or in the laying; the inside of which being polished gives a smoothness, and by the said levers and weights a proper tension, to the rope as it is drawn forward through the press block. By the application of this block ropes may be made at once properly stretched, rendering them decidedly preferable and extremely advantageous, particularly for shipping, inclined planes, mines, &c.

“ The preceding description includes the whole of my improvements; the remaining parts of the machine are similar to those now in use, and which I shall briefly describe as follows, namely:—A wheel or pulley O, is fixed, independent of the machine over which the rope passes, to the drawing motion represented at the side; d, d, is a grooved wheel, round which the rope is passed, and pressed into the groove by means of the lever and weight e, e, acting upon the binding sheave f, to prevent the rope from slipping. After the rope leaves the said sheave, it is coiled away at pleasure; g, g, are two change wheels for varying

the speed of the grooved wheel  $d, d$ ; to answer the various sizes of ropes;  $h$ , a spiral wheel driven by the screw  $k$ , fixed upon the axle  $l$ ;  $m$ , is a band-wheel, which is driven by a belt from the shaft of the engine, or any other communicating power;  $n, n$ , friction strap and striking clutch. The axle  $q$ , is driven by two change wheels  $p, p$ ; by changing the sizes of those wheels the different speed of the drums  $R, R$ , for any sizes of ropes is at once effected.

“ The additional axle  $s$ , and wheels  $t, t$ , shown in fig. 11, are applied occasionally for reversing the motion of the said drums, and making what is usually termed left-hand ropes:  $u$ , figs. 10 and 11, bevelled pinion, driving the main crown wheel  $v, v$ , which wheel carries and gives motion to the drums  $R, R$ ;  $w, w$ , is a fixed or sun wheel, which gives a reverse motion to the drums, as they revolve round the same, by means of the intervening wheels  $x, x, x$ , whereby the reverse or retrograding motion is produced, and which gives to the strands the right twist. The various retrograding motions or right twist for all sizes and descriptions of ropes may be obtained by changing the diameters of the pinions  $y, y, y$ , on the under ends of the drum spindles: the carriages of the said intervening wheels  $x, x, x$ , being made to slide round the ring  $z, z$ ;  $W, W$ , is the framework of the machine and drawing motion;  $T, T, T$ , are the bobbins containing the yarns; their number is varied to correspond with the different sizes of the machines.”

The machine here described, in elevation and plan, is calculated to make ropes from three to seven and one-half inches in circumference, and to any indefinite length.

The Patentee concludes his Specification by the following observation:—“ The general arrangements with my improvements of the machine already described will, I am fully satisfied, be of the greatest importance in the manu-

facturing of ropes of all sizes and descriptions, giving at once facility to the maker and great improvement in the quality and durability of the ropes, the change wheels M, M, M, M, being arranged that they may be so varied and readily adjusted in a few minutes as to give the fore-hard or proper twist to the strands for all sizes and descriptions of ropes, and which being given immediately where the rope is closed or laid, a more perfect regularity both in the twist of the strands and in the laying of the rope is at once obtained than by any other machine hitherto used. The press block P, will not only give a smoothness to and improve the appearance of the rope, but, by the pressure put upon them by the levers and weights 5, 5, the rope may be stretched or tested to answer any purpose it may be required for. This is of infinite service in many cases: ropes made by the ordinary machines have not this advantage, and are often found to stretch so much after being made and put to work, as to reduce in size considerably, which destroys the proper position of the strands, and makes the rope what is technically amongst rope-makers termed long-jawed. The arrangement of the drawing motion, at the side, and that of the retrograding motion of the drums by the different change wheels already described, will be found to be decidedly preferable to similar machines used at present."—[*Enrolled in the Inrolment Office, July, 1833.*]

Specification drawn by the Patentee.

*To WILLIAM WIGSTON, of the gas-works, Salford, near Manchester, in the county of Lancaster, engineer, for his invention of certain improvements in apparatus for consuming smoke; which improvements are applicable to the furnaces of steam boilers, and to furnaces constructed for other purposes.—[Sealed August 12th, 1833.]*

THE improvements described in the Specification of the above Patent consist in the construction and arrangement of certain apparatus for the purpose of regulating the supply of atmospheric air to furnaces of steam boilers, and to furnaces constructed for other purposes, by means of which the smoke is consumed without materially affecting the regular draught or current of air by which the combustion of the fuel in such furnaces is maintained, and the manner in which the same is to be performed and carried into effect will be more clearly seen by reference to the several figures in Plate IV., the same letters of reference denoting the same parts in all the different views.

Previous to the Patentee commencing his description of the drawings accompanying his Specification, he briefly explains the action of atmospheric air in consuming the smoke of furnaces, and the existing objections to the admission of atmospheric air thereto for this purpose, and which objections he states it is the object of his invention to remove. The supply of atmospheric air which passes through the bars of a furnace for heating boilers, or similar purposes, depends on the power of the chimney, size of flues, and other circumstances; but let this be arranged as it may, an effectual draught for a fire in a state of active combustion, which proves quite sufficient for its support, will not be found sufficient when fresh fuel is added to the furnace; and hence a considerable portion of the vapour and gas which is disengaged from the coal,

together with small particles of carbon, are carried up the chimney in the form of smoke. Various contrivances have been applied for obviating the nuisance arising from the smoke of furnaces of this description, the most successful of which have consisted either in supplying the fresh coal in small quantities, so that the combustion should be more rapid and effectual, or in supplying the furnace with an additional current of atmospheric air at the period at which the fresh coal is placed on the furnace. This latter method of consuming the smoke by the admission of atmospheric air has been long practised, but as it is only required at the period at which the fresh fuel is placed on the furnace, any neglect of the servant or fireman who attends to the furnace may allow the additional supply of atmospheric air for consuming the smoke to continue longer than required, or limit the admission of air when it is required: this neglect would either create smoke for want of a supply of air, or, after the smoke is consumed, let down the temperature of the furnace by a superabundance of cold air going into the furnace when it was not required.

These objections, says the Patentee, which entirely depend on the attention of the servant or operative, it is the object of my invention to remove beyond his care, so that he cannot proceed to supply his furnace with fuel without bringing into action the smoke-consuming apparatus, which supplies the required amount of atmospheric air to consume the smoke, and no more.

Fig. 1, represents a longitudinal section of a steam boiler and furnace to which my improved apparatus for consuming smoke is applied. In this figure *a*, represents the boiler; *b*, the furnace, the course of the smoke through the flue being shown by the direction of the arrows towards the chimney; *c*, represents an air chamber for the

purpose of containing a quantity of air, which is heated by its contiguity to the furnace *b*; so that when air is admitted from this chamber to the furnace, for the purpose of consuming the smoke, it goes into the furnace at a considerably higher temperature than the surrounding atmosphere. This chamber *c*, is connected with the external atmosphere by the air flue *d*, which can be opened or shut by elevating or depressing the cone *e*; this cone is suspended from a rod or chain attached to its point or apex, which, when sufficiently elevated, completely shuts the circular opening by which the air flue *d*, is supplied from the external atmosphere.

Now, supposing the supply of air to the chamber *c*, to be cut off by elevating the cone *e*, and the fuel in the furnace to be ignited, the smoke from the furnace would proceed through the flues *b*, and up the chimney, in the usual manner; but as soon as the cone *e*, is depressed so as to allow a fresh supply of air to rush into the chamber *c*, the heated air which it had before contained will flow out at the horizontal opening indicated by the arrow, and thereby supply the furnace with the additional quantity of air required for the combustion of the gas and carbonaceous matter contained in the smoke. As already explained, the extra supply of air is requisite while the smoke exists, but would be detrimental as soon as the furnace became clear; so that it is requisite to the complete action of this apparatus that the cone *e*, should gradually shut off the supply as the smoke gradually decreases, which, together with the depressing of the cone for the purpose of opening the flue when the fresh fuel is placed on the surface, I effect in the following manner:—

Fig. 4, represents an enlarged section of the cone *e*, and the apparatus by which its position is regulated: in the figure *f*, represents an inverted vessel similar to a gas holder, and

*g, g*, a metallic tank partly filled with water, the surface of which is shown by the horizontal dotted line. The vessel *f*, is suspended by the same rod or chain which supports the cone *e*, the upper part of which chain passes over the pulleys *h*, as seen at figs. 1 and 2, and the cone *e*, along with the vessel *f*, are held at their greatest elevation by a counter weight attached to the opposite extremity of the chain which supports them. At the top of the vessel *f*, is placed the stop cock *i*, and an hydraulic valve *j*, the construction of which will be seen at fig. 4, where the water line which seals the joint is shown in dotted lines, and a spiral spring for the purpose of assisting in the opening of the valve is delineated.

By referring to fig. 2, it will be observed that the counter weight which supports the cone *e*, and vessel *f*, rests on the tail end of a small lever *k*, which forms part of a toothed sector vibrating in a common centre. This toothed sector gears into another bevel sector which is cast upon the face, and forms part of the door of the furnace. Thus it is impossible for the fireman to open the furnace door for the purpose of adding fresh fuel, which would generate smoke in ordinary furnaces, without vibrating the lever *k*, which elevates the counter weight, and depresses the cone *e*, and inverted vessel *f*, the depressed cone allowing air to flow into the chamber *c*, and thence into the furnace as already described, and the hydraulic valve *i*, allowing the air contained in the upper part of the vessel *f*, to escape at the same time. In this position it is clear that the vessel *f*, and cone *e*, cannot rise to shut off the supply of air to the chamber *c*, without at the same time overcoming the atmospheric pressure on the upper surface of the vessel *f*, for which the counter-balance weight is not sufficient.

It is therefore necessary to adjust the opening of the cock *i*, that the requisite supply of air to the interior of

the vessel *f*, may be admitted, and the gradual elevation and the gradual closing of the circular opening for admitting air to the flue *d*, by means of the cone *e*, be regulated. The period of time required for the complete consumption of the smoke caused by a fresh supply of fuel to the furnace will be ascertained by a little experience; and it is only required to adjust the cock *i*, so that the rising of the cone *e*, and the shutting off the supply of air to the chamber *c*, terminate at the same time as the smoke ceases to be created. The cock *i*, being properly adjusted, the key by which it is adjusted may be removed, so that the fireman has no control over the apparatus.

There is a short time between the fireman opening the furnace door and putting on the fuel, in which the admission of air from the chamber *c*, is not required; and although this is not of any great importance, it may be obviated by the arrangement shown at fig. 3, where the cone and vessel *f*, are suspended from a lever *m*, which vibrates on its centre *l*. From the opposite end of this lever *m*, to which the cone is suspended, is placed a perpendicular bar *n*, having a joint opening outwards at *o*.

In this arrangement, when the fireman opens the fire door, the small projection from the upper part of the door, as shown in the drawing, bends the bar *m*, at the joint *o*, which again falls into its perpendicular position as soon as the door is wide open, without affecting the cone *e*, in any way. But as soon as the fireman has placed the fuel on the furnace, he cannot shut the door without removing the lower part of the bar *n*, which he elevates by hand, and thus depresses the opposite end of the lever *m*, and the cone *e*, producing similar effects as those already described in the former arrangement. In the apparatus already described for regulating the motion of the cone *e*, the variation of speed is wholly dependant on the adjustment

of the cock *i*, by which the air is admitted into the vessel *f*, but a similar effect may be produced by the apparatus shown at fig. 5.

In this figure *p*, represents a vessel open at the top, and having two large valves opening inwards, as seen also in plan at fig. 6; this vessel *p*, is placed in a tank of water, similar to *g*, in fig. 4, and suspended by the rod and counter weight, in every respect similar to the inverted vessel *f*, already described. Now, as soon as the fire door is opened and the vessel *p*, depressed, in the manner already described, the water in the external tank *g*, will flow in by the two valves in the bottom of the vessel *p*, and the progressive rise of this vessel, for the purpose of regulating the cone motion, is adjusted by the opening of cock *q*, which allows the water to flow out at any speed which may be required, and thereby regulates the motion of the cone beneath, which is connected as already described.

The duration of the supply of air to the furnace, in both the arrangements already described, depends on the adjustment of the cocks *i*, and *q*, the counter weight being always the same; but it is equally susceptible of variation by varying the shape of the cone itself, which being formed more taper, or having its upper part cylindrical, would vary the amount of air admitted, as well as the period of its duration; but these variations of construction must depend on the nature of the furnace to which my invention is to be applied. I prefer the cone form from its property of regularly decreasing the amount of air admitted to the furnace as the smoke to be consumed decreases: this, as well as other minor arrangements, must depend on the judgment of the parties who apply my invention.

For applying my invention to furnaces in which the supply of fuel depends on a feeding apparatus attached to an engine or other moving power, I make the opening action of the

cone E, dependant on the strap or moving power which drives the feeding apparatus; so that as soon as the supply of fuel commences, the cone is depressed and the supply of air commences, but as soon as the feeding ceases, the supply of air gradually decreases also.

The application of my invention to furnaces supplied with fuel, by apparatus of this nature, enables me to keep more fuel on the bars of the furnace without the fear of creating smoke, and thereby renders the heat generated more regular than is usual in furnaces fed by machines.

Having described the nature and construction of my certain improvements in apparatus for consuming smoke, I hereby declare that I do not claim any separate or well-known part of such apparatus, but I do claim as my invention that arrangement of parts as hereinbefore described, by which the requisite supply of air is regulated for consuming the smoke of furnaces simultaneously with the feeding of the furnace, or the supply of fuel which causes the production of the smoke.—[*Inrolled in the Rolls Chapel Office, February, 1834.*]

Specification drawn by Mr. W. Nicholson.

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*To LOUIS SCHAWBE, of Manchester, manufacturer, for his invention of certain processes and apparatus for preparing, beaming, printing, and weaving yarns of cotton, linen, silk, woollen, and other fabrics, so that any design, device, or figure, printed on such yarn, may be preserved when such yarn is woven into cloth or other fabric.—*  
[Sealed January 22d, 1831.]

THE Patentee describes his improved processes as follows:—Before commencing the description of the various appa-

ratus by which I effect the printing of yarn so as to preserve the figure or design after such yarn is woven into cloth or other fabric, I shall mention some particulars to be attended to in the selection and preparation of yarn to be used for this purpose. Although the effect which I am about to describe may be produced with yarn of any description ordinarily used as warp, that which I recommend when cotton, linen, or worsted is used, is such yarns as have been singed by flame of gas or other means, so as to divest it of its loose fibres. This yarn should be made into hanks and bleached, or submitted to any of the ordinary preparations practised by printers previous to block printing, which preparations must altogether depend on the style of pattern which is intended to be produced thereon.

The yarn is to be formed into a warp, and afterwards beamed in the usual manner, care being taken to wind the beam particularly true. At this period of the process it is essential to pick the warp carefully, and clean it in the same manner as weavers do previous to weaving cloth.

The warp being now placed on the beam, the processes and apparatus will be more clearly understood by reference to the several figures in Plate IV.

Fig. 5, represents an elevation or side view of a machine for re-beaming the warp from the first beam on which it has been wound in the ordinary manner. In this figure A, A, A, represents the framing; B, the first beam, whereon the warp is placed; this is supported on its axle, and held stationary by means of a break or drag shown at C; this arrangement of a break is too well known to require any particular description, and is regulated by the position of the weight c, on the lever from which it is suspended; D, D, represents a board pierced full of holes, better shown in the detached plan view at fig. 6. This board is suspended by means of strings from each corner, connected

to the framing above, and so arranged as to enable the operator to place it in the position shown in fig. 5, or lower it to the dotted line  $d, d$ ; this board is called a "comber board," and is here placed for the purpose of supporting and arranging small metallic pieces called "mails," one of which is represented on a larger scale at fig. 7. These mails are arranged on the upper side of the "comber board," one to every end of the warp, and at a distance from each other, which agrees with the number or fineness of the reed to be used in the weaving about to be performed.

It will be seen that there are two holes in the mails, (see fig. 7,) to the lower of which is attached a small string and leaden weight E, which is commonly called a "lingo;" so that when put in its place, as seen at D, D, the mail being too large to pass through the hole in the comber board, rests on its upper surface, and is held stationary by means of the string and lingo weight E. Through the upper hole of every one of these mails an end of the warp is passed, which proceeds forwards over the cylinder F, as seen in fig. 5, through the healds G, and the reed of the lathe H, on to the beam I, whereon it is re-beamed.

In the first operation of a machine of this construction it will necessarily require to be gaited or put in order, by passing the ends of the warp through the respective mails and other parts of the apparatus; but supposing it to have been in action, and a warp finished re-beaming from the beam B, to the beam I, the mode of proceeding would be as follows:—

The first warp being placed in the position represented at B, it is twisted or joined to the thrum of the last warp at the point M, in the ordinary manner, the ends of the respective warps being preserved by means of leashes, as shown at m, and n. As soon as this twisting or joining

of the old and new warp is effected, the beam I, is turned in the direction of the arrow, and the warp drawn forward until the twisting arrives in the front of the reed H, where a piece of cloth is woven of from three to four inches, having a rod or straight piece of wood woven into it. The thrum, or end of the old warp, is now removed, and the remainder, containing the rod of the new warp, is attached to an empty beam J, by means of the rod fitting into a slot or groove in the beam I. At this period the comber board is lowered to the position *d, d*, and the mails and lingoes allowed to hang on the warp, thus producing an equal tension on every end of the warp during the re-beaming process.

It is to be remembered that this machine is for the purpose of re-beaming preparatory to printing, and that the use of harness or weaving apparatus is, firstly, to weave a piece of cloth as before described, by which the rod is secured in the warp and thereby attached to beam I; secondly, to strike a leash in front of the reed when the warp is near its termination on the beam B; and, thirdly, to weave a second piece of cloth for the purpose of securing the leash, and also for fastening the ends of the thrum which remain in the machine for the succeeding process.

In operating with this machine, attention must be paid that none of the mails at any time rest on the comber board when in the position *d, d*, which would necessarily destroy their action of keeping the ends of the warp at an equal tension. I recommend pasteboard to be placed occasionally on the beam I, during the process of filling, to keep the surface more regular; the position of the weight *o*, must also be attended to, as it is obvious that the drag of the beam B, must increase as its circumference decreases; but these and other minor points must be acquired by practice, and are well known to parties engaged in fancy weaving.

Fig. 8, represents an elevation or side view of another machine, for the purpose of transferring the warp which has been re-beamed on to the beam I, in the last described machine, to another beam O, in this figure, and at the same time printing the warp so transferred with a pattern or design which is to be preserved in the cloth into which the warp is afterwards woven.

In this machine the beam I, containing a warp, as placed by the last machine, is seen in front of the harness or weaving part of the machine; which harness, as in the last described machine, is for the purpose of weaving small pieces of cloth at the extremity of the warp, by which means the ends are kept even, and a rod inserted, as before described, for the purpose of attaching to the beam. The warp, in this machine, is carried in an horizontal direction from the beam I, through the heald, and over a printing table N, N, to the beam O, which beam being forced down by a lever or otherwise, takes up the warp from the beam I, which latter gives it off at a tension determined or regulated by the friction of the drag P, and weight  $p$ , similar to the drag in the last machine.

The gudgeons or supports on which the beam O, revolves are elevated or depressed by a screw movement, shown at Q, by means of which the operator is enabled to keep the warp horizontal in its passage over the printing table N, N, and to compensate for the rise caused by the filling of the beam O, during the process.

In commencing with this machine it is required that a thrum be put in or drawn through the heald and the scale marked  $t$ , which is of a peculiar construction, hereafter described, to the end of which the new warp is twisted or pierced in the ordinary manner; and supposing the machine to be regularly at work, and a full beam I, brought from the last described machine, the mode of proceeding would be as follows:—

The small piece of cloth on the new warp must be gradually cut away as the twisting proceeds, which is to join the new warp to the old thrum at the point S; and as soon as this is done, the beam O, is put in motion till the twisting is carried in the direction of the arrow to the point T, at which point a piece of cloth of from three to four inches is woven by means of the scale t, which is suspended from the frame above by strings. This cloth is for the purpose of holding the ends correct, and containing a rod as already described.

This being done the old thrum is removed, and the scale t, placed between the table and the beam O, at the point T, where it is suspended as before, the warp is attached to an empty beam O, and the printing commences.

I must here remark that it is requisite that the machinery be accurately constructed, and the beams I, and O, parallel to each other; which being the case, it is obvious the whole of the warp will remain at an equal tension, and present an uniform surface in its transit over the printing table N, N.

The printing is performed by blocks, plates, or otherwise, precisely in the same manner as calicoes are printed; and the traverse of the yarn is only caused to take place at stated periods, namely, when the printing of that part immediately over the table N, N, is completed. During this part of the process, any irregularity which may arise by moving the warp over the surface of the printing table is immediately rectified by moving the healds.

Annexed to the printing table N, N, is placed a cylinder U, over which the warp passes towards the table, the upper surface of which is about one-sixteenth of an inch above the surface of the printing table, and on a level with the beam O, which is adjusted by means of the screw Q, before described; so that the warp has a tendency to spring

up from the blanket when released from the block, which I consider essential to produce good work by my process.

In fig. 8, W, and W 2, represent two cylinders, both parallel with the beam O. On the cylinder W, is placed a piece of calico, somewhat wider and longer than the warp at the commencement of printing. This calico is passed in the direction of the arrows under the printing table N, N, and over the guide roller Z, where it proceeds over the printing table and on to the upper cylinder W 1; the cylinder W 1, is moved by a strap from the beam O, which causes it to take up as much calico on to its surface as there is warp taken on to the surface of the beam O, thereby presenting a fresh surface of calico to every surface of warp which passes over the printing table N, N, and consequently keeping the blanket clean during the process of printing.

There only remains now to remark, that the healds which I have found to answer best, both in the process of re-beaming and printing, are those called long-eyed healds, from their offering less obstruction to the passage of the warp during the process, and that the use and construction of the scale t, is very essential to the performance of good work.

Having determined the number or fineness of the reed to be used in the cloth about to be manufactured, I take the same reed for the purpose of making the scale t, and form a warp of strong yarn, of which I prefer hard silk, which must be carefully beamed and re-beamed, in the manner already described; it must be then woven in the following manner, with as much weight as possible. First, one inch of cloth; then insert a perfectly straight iron rod, after which about half an inch more cloth is woven: this being done, about five inches of the warp is drawn over

without being woven, and then another half inch of cloth is woven, and a second iron rod inserted, which is kept fast by weaving another inch of cloth as before. At this period the whole of the woven parts of the scales are saturated with a strong solution of gum, for the purpose of keeping the threads of the warp more firmly in their position.

The appearance of the scale thus far constructed will be seen at fig. 9; but as the spring or elasticity of the rods X, X, which are kept equi-distant by the side pieces Y, Y, would not keep the warp at the requisite tension, I have found it necessary to imbed the rods in hard wood frames, of which I represent a section at fig. 10, which when closed together, by means of screws or other fastening, forms a scale as represented at fig. 11.

The scale t, thus constructed, is suspended from the beaming of the machine; and it is requisite, in the first place, to spread the warp to be printed even and regular in its passage over the printing table, which is effected by carrying each separate end of the warp through a distinct opening in the scale; in the next place, to obviate the necessity of rods in the subsequent process of weaving, when removed to the loom, which it does by enabling the weaver to find an end when broken, in the same manner as rods would do; and lastly, as it is not affected by the chemical action of the mordant or other preparation used in printing, and any accumulation of mordant or other preparation is easily removed by a sponge or other means, as the process of printing proceeds.

In using the scale it is desirable to commence with the scale suspended at its highest point, and as the printing proceeds, the operator should gradually lower it as the scale becomes soiled by the printed warp passing through it; and as soon as the whole five inches of the scale which are left open for the passage of the warp have been passed

downwards; it may be cleaned, which being done, it is again raised to  $w$ , its highest elevation, and the process re-commenced. When the printing of the warp is finished, I recommend to let about one yard and a half be wound back on the beam I, and having raised the beam O, by means of the screws Q, to place the scale in its first position at T, and weave ten or twelve picks of weft for the purpose of securing the warp ends; the printed warp is then again drawn forward to the beam O, a leash is taken and secured by weaving five or six inches of cloth with a rod in it, so that when the five or six inches of cloth is divided, the rod remains with the thrum and scale, and the printed warp on beam O, is removed to the loom wherein it is to be woven; and when removed to the loom, the ten or twelve picks above named are taken out as soon as the twisting is complete, and about a yard of cloth woven.

It will also be remarked that the pasteboards which have been previously placed on the beam I, are, in this process, replaced on the beam O, as it becomes liberated from I, for the same purpose of keeping the warp more regular; and that the drying of the printed yarn is greatly accelerated by the use of a fan, similar to those used by weavers for drying their warps in ordinary weaving.

The printed warp upon the beam O, is now transferred to a loom, which should have as short a ratch as can be allowed; and the greatest care must be taken that the cloth beam and the beam O, are accurately parallel, as well as that the surface of the warp be kept horizontal, which is effected by means of screws similar to those seen at Q, in fig. 8; and I also recommend, in the weaving of printed yarns, the use of clasped healds, which consists of opposite loops interlocked in each other, so that the warp passing through both loops, as shown at fig. 12, is held firm in the healds, and not allowed to move in them during the action of

weaving. The use of clasped heads, together with the scale *t*, which enables me to dispense with rods in the process of weaving, I consider essential to preserving the pattern on the warp, and as an important part of my invention.

When the warp is woven into cloth, the pattern which has been printed on it must be dyed, raised, washed, or prepared, or perfected according to the ordinary processes used in printing; all which must depend on the previous preparation of the yarn and the style of work which it is intended to produce.

Having now described my certain processes and apparatus for preparing, beaming, printing, and weaving yarns of cotton, linen, silk, woollen, and other fibrous substances, so that any design, device, or figure, printed thereon may be preserved when such yarn is woven into cloth or other fabric, I declare that I do not claim as of my invention any separate or well-known parts of the apparatus or machinery hereinbefore described; but I do claim the arrangement and application of those parts as an apparatus, and the processes or manner of working the same, by which the re-beaming, printing and weaving the warp, so as to preserve the pattern, is effected, all which I believe to be new, and never before practised in this kingdom.—[*In-rolled in the Inrolment Office, July, 1831.*]

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In Vol. I., page 32, of the Second Series of the London Journal of Arts, will be found a description of the patent process invented by Mr. Bennet Woodcroft, of Manchester, "for printing and preparing for manufacture yarns of linen, cotton, silk, woollen, or other fibrous material." Sealed 31st March, 1827.

This invention of printing yarns to be woven into speckled

cloths of variegated patterns, has been for the last seven years in very successful and extensive operation at the works of Messrs. Woodcroft and Son, Salford, near Manchester; and we are utterly at a loss to conceive how it has happened that the subject of Mr. Schawbe's Patent above described, and emanating from the same neighbourhood, can be now proposed to the public as a new invention.

Seeing that the greater part of this Specification is occupied in describing in minute details the ordinary mode of beaming yarns, which is well known to every weaver of the slightest experience, we should have given only a brief statement of the Patentee's intentions, in which we discover no one feature of novelty; but from the definite claim set up by the Patentee, (of the "arrangement and application of those parts as an apparatus, and the process or manner of working the same, by which the re-beaming, printing, and weaving the warp, so as to preserve the pattern, is effected," which he "believes to be new and never before practised in these kingdoms,") we are apprehensive of having overlooked or misconceived the presumed novel points, and have therefore given the Specification with all its details in full.—**EDITOR.**

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*To ROBERT BEART, of Godmanchester, in the county of Huntingdon, miller, for certain improvements in making or producing tiles for draining lands, buildings, and other purposes.—[Sealed 25th May, 1833.]*

This invention relates to a peculiar arrangement of moulds, and the manner of working clay into them, whereby tiles may be produced with greater facility than by the ordinary

means of making. Plate IV, fig. 13, is an elevation of a machine with two moulds constructed according to this invention, some of the parts being shown in section the better to exhibit their construction. Fig. 14, is a horizontal view of the same. In each of the figures the same letters refer to similar parts : *a*, *a*, is a strong frame of wood or other material supporting the machinery ; *b*, is a pug mill of the ordinary construction, for grinding and preparing the clay or other mixture of materials. At the bottom of the pug mill is an opening, through which the moulds *c*, *d*, are alternately filled in the manner described hereafter.

The moulds *c*, *d*, are quadrangular boxes mounted on the cross frame *e*, which turns on a shaft *t*, placed between the two moulds, by means of which the moulds may be successively brought under the opening at the bottom of the pug mill, and alternately become filled with the mixture of clay and other material by the working of the mill, whilst the material contained in the other mould is being worked off into tiles.

A false bottom *f*, is made to each of the moulds, resting on ledges *g*, at the bottom ; *h*, is a piston or plunger, which being raised by means of a quick screw *j*, causes the bottom *f*, to press up the clay contained in the moulds ; *i*, is a bevelled toothed wheel, its axle turning on proper bearings affixed to the framing of the machine.

Through the centre of the boss of this wheel is formed a female screw corresponding to the screw *j*, which works the piston or plunger ; *k*, is another bevelled toothed wheel taking into and driving the wheel *i*.

The axis of the wheel *k*, turns in bearings on the framing ; and on the axis of the wheel *k*, there is a pinion *l*, taking into a toothed wheel *m*, which drives the pinion *l*. The wheel *m*, is mounted on an axle carrying the lever or handles *n*, for giving motion to this part of the machinery.

Having described the various parts of the machine, the Patentee proceeds to explain the manner of its operation.

Supposing the mould *c*, to be full of clay, the mould *d*, will consequently be under the pug mill, and be receiving its supply of clay therefrom; meanwhile the clay contained in the mould *c*, is being worked into tiles. On turning the handle *n*, the wheel *m*, will drive the pinion *t*, and with it the wheel *k*, and this wheel *k*, will turn the wheel *i*; and thus, by means of the screw *j*, the piston *h*, will be made to force up the required thickness of clay for making a tile, which is to be removed in the following manner:—

Fig. 15, represents an instrument for cutting the required thickness of clay from the mould to form a tile; *o*, is a wire stretched from the points *p*, and which forms the cutting part. In cutting off a tile, the workman places the parts *p*, on the mould, its two sides acting as guides, and pressing on the handles *q*, draws the wire through the clay, thereby cutting off a portion to form a tile, which may be readily removed by hand.

The upper part *r*, of the cutting tool acts as a strike or level, and is to be passed backwards and forwards over the surface of the clay in the mould to smooth its surface. The workman then turns the handles *n*, and when a second quantity of clay is brought over the mould *c*, it is to be removed in like manner, and so on till this mould is empty: the pug mill may then be stopped, the piston or plunger *h*, run down, and the position of the moulds reversed; that is, the empty mould *c*, brought under the pug mill, and the full mould *d*, placed above the piston.

This is effected by turning the shaft and moulds by means of a lever *u*, *t*, placed against the corner of the mould, and against the spindle *t*, as shown in fig. 14, and thereby cause the two moulds to revolve on the spindle; *s*, is a circular table, on which the moulds *c*, *d*, travel; the clay in the

mould *d*, may then be worked off in like manner to that just described.

It will be evident that any other desired figures than square tiles may be produced by forming the moulds to the shape required ; as, for instance, when the tiles are intended for draining, they will only require to be bent over a proper shape or mould whilst moist, and may then be dried and afterwards finished in the kiln as usual.

As this invention only relates to the moulds, and manner of working the clay therefrom into tiles, and method of removing the same, it will not be necessary to go into any further description. The Patentee concludes his Specification by the following remarks :—“ Having now described the nature of my invention, and the manner of constructing and using the same, I would observe, that in place of the moulds remaining stationary whilst the clay is forced up by the piston, it will be evident that the piston may remain stationary, and the moulds descend by means of toothed wheels and racks, or otherwise ; and I would have it understood, that although I have described the moulds as combined with and supplied by a pug mill, I do not confine myself to that manner of using them, as they may be filled by hand or otherwise, but in such case it will be desirable to beat the clay in order to press the same more intimately together, and make it more close-grained than it would be by merely putting a quantity in the moulds. And further I would have it understood, that I lay no claim to the various parts separately of which the machinery is composed, they being separately well known and in use ; but what I claim is, the construction of moulds *c*, *d*, as above described, from which a succession of tiles may be cut as the clay is caused to project therefrom, as above described.”

—[*Enrolled in the Inrolment Office, November, 1833.*]

## S U G A R R E F I N I N G.

Report of Experiments on Sugar Refining, by Dr. ANDREW URE, M.D. F.R.S., Professor of Chemistry, made by direction of the LORDS of the COMMITTEE of PRIVY COUNCIL appointed for the consideration of all Matters relating to Trade and Foreign Plantations.

THESE researches were instituted at the desire of the Right Honourable the Lords of the Committee of Privy Council for Trade and Plantations, for the purpose of ascertaining the average amount of extracts, in loaves, lumps, bastards, and treacle, which one cwt. of sugar will yield when carefully refined by the common processes.

At a meeting with the deputies of the West India Association and the sugar refiners, in presence of their Lordships, in October, 1831, an understanding was entered into, that I should pursue a middle course in these experiments, following the common method of clearing the loaves with clay-pap instead of fine syrup, a practice confined in a great measure to the patent houses, in which the vacuum pan is employed; but using animal charcoal in clarifying the raw sugar.

Many causes concur to render the results of such occasional experiments, limited to 10 or 15 tons of sugar, less productive than those of a regular going sugar-house, supplied with a corps of expert and intelligent artisans, attached permanently to the establishment. It was obvious that the situation of my master-boiler could offer little inducement to an able man to accept an office regarded with an invidious eye by many members of the trade. Yet on the skill and fidelity of that person much of the success of such experiments must depend.

After a diligent search, I was obliged to content myself with a German sugar-boiler, of known integrity, but of no scientific knowledge, who had grown old in pursuing one routine of operations in a considerable sugar-house in the City, then abandoned. It required unceasing and vexatious vigilance on my

part to guide him in almost every stage of the process, such as the boiling sugar in a pan heated by a bath medium, the filtering through tubular bags, and the use of animal charcoal ; to all which matters he was a stranger. He was, moreover, quite unacquainted with the mode of working clayed Brazil sugar, and as our first experiments were performed on a damaged article of that kind, he naturally committed many mistakes, particularly with regard to its granulating pitch in the boiling pan. From what I have since learned, however, of the boiling of bad Brazil sugars by regular refiners, and of the delicate nature of sugars in general, it appears matter of congratulation that our first experiment turned out such a quantity of granular sugar as it did. Having unfortunately lost this man by a sudden death, in June, 1832, after he had become familiar with my processes, I was obliged to replace him immediately by another German, who had been for some time unemployed.

The sugar-house in Ellen-street, Whitechapel, which was hired for the purpose of these experiments, was a small one, but well lighted, and enclosed by a spacious yard. It consisted of a ground floor, sunk 3 or 4 feet beneath the level of the street, 33 feet long and 30 feet wide, surmounted by three stories. The sunk floor formed the laboratory or fill-house, and is represented in the ground plan, fig. 1, Plate V. The entrance door is seen to the right ; B, is the melting-pan, capable of holding fully a ton and a half of sugar in the clarifying process. Immediately above the melting or clearing-pan, on a level with the first floor, a covered copper cistern, for receiving the contents of the subjacent pan, is fixed firmly against the wall, and enclosed by sloping boards to screen it from the cold air. Our usual melting of the raw material consisted of about thirty-three or thirty-four cwt. dissolved in about one-third of its weight of lime water. For the above quantity of sugar, about eight gallons of bullock's blood, and one cwt. and a half of bone black, were employed. Our usual mode of clarifying was to introduce the water first, then mix in the blood with considerable agitation, and lastly the sugar. On applying fire, the materials were carefully

and continually stirred. In about an hour and a half after the application of the heat, the mixture came to the verge of ebullition, but the heat was so tempered as to prevent brisk boiling. Meanwhile the scum rose progressively in a thick froth, till it stood nearly six inches above the fluid part. The fire being then damped, the scum floated very level on the surface, and was easily removed by a skimmer. It was conveyed into the scum-cistern in the corner of the fill-house, at the places marked H, in the Drawing, fig. 1. The animal charcoal was now introduced, and well incorporated with the syrup by means of the paddle; after which three gallons of blood were poured in with constant agitation of the mixture. The fire was once more urged till a new scum rose to the surface, containing the finer particles of the charcoal, entangled in the clot of blood. As soon as this scum had acquired its greatest height, the fire was extinguished. Soon thereafter the scum formed a crust, which cracked with dry fissures, like parched ground.

A pump-pipe was now let down to the bottom of the pan. Its lower end was inserted in a thin hollow drum pierced with many holes, called the shoe. By this contrivance, much of the animal charcoal and the grosser impurities were kept out of the pump-pipe, whereby the valves continued clear. The whole liquid contents of the pan were now pumped up into the covered cistern formerly mentioned.

In fig. 2, a vertical section of the tubular bag filter is shown; and on the top of the chest from which the bags are suspended by screwed nozzles, is seen the large pipe that conducts the foul liquor into the copper filter-cistern A. The large stop-cock at D, regulates the admission of the foul syrup into the filter. The clear liquor falls from the bags into the shallow cistern B, fig. 2. This cistern discharges itself by a two-way stop-cock at B, which permits the liquor to run into the little cistern E, while it is foul, but lets it be turned off into the great reservoir C, whenever it becomes fine. Each of these cisterns is furnished with a pump; that of the foul liquor returns it into the melting pan, whence it is raised once more into the upper reservoir for re-filtration; and

that of the cistern C, conveys the fine liquor through a large pipe into the evaporating pan, marked D, in fig. 1. This pan was contrived by me for the purpose of evaporating syrups very rapidly, without exposing them to the action of a naked fire. The outer case, marked *aa*, consists of iron, and is alone exposed to the flame. The inner pan, marked D, is copper. Its bottom is corrugated so as to bring a double extent of metallic surface under the horizontal area of the liquor. Between this corrugated bottom and the bottom of the iron case is an interval of from two to three inches, which is filled with the liquid saline bath. This medium, though heated to 320° Fahrenheit, has no power to decompose the sugar contained in the copper pan, even when left dry on its corrugations. At the point marked 1, a pipe, three inches diameter, is attached, for giving easy egress to any steam that may be generated from the saline bath, in consequence of an accidental excess of fire. In the orifices at 2 and 4, thermometers are stationed for indicating the temperature of the bath. Should its temperature rise higher than is desired, the admission of a few pints of water into it through the stop-cock, shown at H, fig. 3, will lower the boiling point of the medium to the proper pitch.

Fig. 3, shows a vertical section of this sugar-pan, in which D, is the exterior case of iron, A, the interior pan of copper, corrugated in the bottom, so as to double the evaporating efficiency of the heat, without augmenting its intensity. C, in fig. 1, is the gutter into which the corrugated channels empty themselves, and D, fig. 3, is the discharge plug-pipe of the granulating syrup. B, C, and F, represent the steam-pipe and condensing cistern for restoring the vapour of the bath liquid in the state of water, through the small tube at the side of the pipe B. The usual charge of the pan is eighty gallons of syrup, which are made to boil briskly within two minutes of their admission, and may be granulated in fifteen or eighteen minutes more. As the fire needs not to be damped, and as the bath liquor forms at once a skreen from the scorching power of the flame, and a magazine of heat, this sugar-pan combines safety with power of evaporation in an eminent degree.

Whenever the master-boiler perceives by the proof of the touch, that is, by the appearance of a globule and thread of the boiled syrup formed between his finger and his thumb, that it has come to the proper granulating pitch, he opens the discharge-pipe, and the mass flows off through G (fig. 1, AA), into the cooler E.

The plug being now replaced in its seat, a fresh charge of syrup is rapidly pumped into the corrugated pan, and being concentrated, is let off into the cooler. This is called the second skipping. The artifice of the refiner, called granulation, now begins. The pan-man, with a wooden paddle shaped like an oar, dashes the cooling syrup violently against one side of the cooler, which is raised for the occasion by the application of a semi-cylindrical sheet of copper, called a crib or brace. The more the syrup is beat, the smaller is the grain of the sugar, and the whiter is its colour, but its lustre is less.

The third skipping being eventually admitted into the granulating mass in the cooler, the whole contents are well mixed, and are then transferred into the earthenware-moulds previously arranged in one side of the fill-house, as at F, for its reception. These moulds are always previously soaked in cold water in the cistern marked K. They are lifted out with an instrument like a boat-hook, allowed to drain a little on boards laid across the cistern, then plugged at their apex with a piece of rag, placed upright side by side on their points, and propped in their position by broken moulds standing on their bases.

The granulating syrup is lifted out of the cooler by copper ladles into oblong two-handled copper basins, which are carried to the moulds, and carefully emptied into them. Each mould commonly receives no more than one-third of its charge at the first round of filling, another at the second round, and another at the third, which finally brings the syrup nearly to the brim.

The next step in sugar refining is called hauling. It consists in stirring up the thickening magma in the moulds, to ensure uniformity of temperature, and of texture in the loaf. In this operation several men work at once, provided many moulds be

filled. Each takes a wainscoat knife of a size proportioned to that of the mould, and keeping his hand over the centre of the base, he scrapes the sugar from the sides of the moulds by successive downward strokes of the spatula, which he moves in a similar way all round. After two such revolutions, the granulating mass is allowed to rest some minutes till it grows a little stiffer. The moulds are now left undisturbed on the fill-house floor till next morning, when the sugar has become concrete. They are then pulled up through the shaft of the square hatch-holes left in each floor. The hatches being placed in a vertical line, a rope is let down in their middle from a pulley attached to a well-supported beam in the centre of the roof.

After the moulds of the day are hauled, it is the pan-man's duty to make over the scum which was taken from the melting-pans in the morning, by squeezing its moistened bags so as to extract all its saccharine contents. The washings of the scum bags are worked up with the next melting of raw sugar.

The cooled moulds are raised into one of the upper floors, where a proper number of well sorted pots have been previously arranged to receive them. Before setting the cone into the mouth of the pot, the plug is removed from the apex, and the point of the loaf is pierced with an awl-shaped tool called a pricker.

If the loaves have been properly boiled, the green syrup will run off from them in a couple of days, and it must be removed from the draining pots and poured into others of a larger size, called gathering pots. The emptied pots being replaced under their respective moulds, a ladle-full of clay pap is poured on the base of the loaf; this pap is previously prepared in the clay cistern marked I, in fig. 1, by triturating some pipe-clay in clean water, and passing the mixture through a cullender. The above first or green clay, as it is called, dries up into a cake in five or six days, when it is taken off and laid aside for future conversion into pap; the surface of the loaf will meanwhile have shrunk and become concave.

With a tool called a bottoming trowel, the sugar which adheres

to the sides of the moulds is scraped off, and a small quantity of lumps, pulverized on purpose, is laid over the loose sugar separated by the trowel. The whole is then firmly pressed down on the base of the loaf to a level surface for bearing the next clay.

When the second clay becomes dry, it is removed, after which each loaf is drawn out of its mould, a process called *overseeing*. If the loaves are neat, that is, if the brown tinge has left their tips, as is best proved by cutting off two or three of them, the workman proceeds to the operation of brushing off and removing the irregularities and clayey impurities with an iron tool, with one corner of which also he inscribes a letter or number on the base of the loaf. Such loaves as require it, receive a third clay in a thin layer, or have a little moisture applied to the surface of the second clay.

The cleaned loaves are left a few days in the moulds to acquire face, or that compact hardness of surface which will enable them to stand firm when turned out of the moulds; during this interval, they are once or twice loosened by a gentle blow against a block of wood. Thus, by preventing adhesion to the moulds, and permitting the escape of moisture, the coats are much improved.

On taking the moulds from the pots, the workman covers the floor with coarse brown paper, and turns down each loaf on this paper with its mould over it. If the room be properly heated, the moisture will disperse itself equally through the loaf in twenty-four hours, and give the cone an uniform aspect. The loaves are now set in the stove, either covered with paper or naked; and at the end of eight or ten days they are taken out, and papered for the market.

With lumps, the practice is to cut off the coloured tips, instead of waiting till they become neat. These tips, under the name of lump headings, are drained in a heap, in a large mould, and subsequently melted for making fine loaves. The syrups discharged from refined sugar during the operation of draining, usually exceed in weight and bulk the residual weight of loaf or lump sugar, and are therefore objects of great consequence, on the

proper management of which the success of the manufactory mainly depends.

I regret that circumstances did not permit me to adopt as my general practice the clearing the loaves with fine syrup, called liquoring, instead of using clay pap. The former process is not only a much quicker, but, from small trials I have made, it is more productive than the latter.

As the main object of Government in instituting these experiments was to ascertain the existence and amount of bounty that might be involved in the present system of drawbacks allowed by law on the exportation of refined sugars, it was incumbent on me to work on the plan best adapted for the export trade. I accordingly carried the comminution of the saccharine grain in the cooler further than I should have done in working for the home market, and in this way studied to produce the full proportion of loaves equal in whiteness to the standard. Grain was never wholly sacrificed, as will be proved by the prices latterly obtained for our refined sugars in the home market, which are higher than the export broker would give. It will be seen that the prices of our sales are fully equal to the average of the trade.

By the actual fiscal regulations, there are two rates of drawback allowed on the exportation of sugar loaves, one of 43s. 2½d. per cwt. for loaves of a certain whiteness equal to that of a standard loaf in possession of the Custom-house searcher; another of 36s. 9½d. for all well-cleared loaves of a shade darker than the standard. A singular phraseology is in use among refiners, who say of a very white loaf that "it has a great deal of colour."

The relative whiteness of loaves depends not merely on the quality of the raw sugar from which they are made, nor on the degree of paleness to which the saccharine liquor has been brought by animal charcoal and other means, nor on the boiling processes, but in no small measure on the style of granulation in the cooler.

We have stated that this vessel serves to receive in succession three or more charges or skips from the boiling pan, which are

all mixed together to secure uniformity to the product before it is transferred into the sugar-loaf moulds. In proportion to the evaporating power of the pan, and the magnitude of the skip, two hours or more necessarily elapse before the cooler can receive its full charge, called a *filling*, as being adequate to fill one series of moulds. If the concentrated and granulating syrup be but slightly stirred during this interval, the sugar loaves formed from it will be large-grained and display a sparkling aspect: if, however, the granulating mass be violently beat and tossed about with a paddle, the resulting sugar loaves will be small-grained and have little lustre, but they will be considerably whiter than the sparkling loaves; supposing every other condition the same. The taste of the English consumers of refined sugar is for large-grained glistening compact goods; that of the French consumers is for a snow-white article of little lustre and inferior density. Hence a larger proportion of loaves of the latter quality or standard may be made from a like weight of raw material, than of loaves of the former quality, if the colour of both be the same.

The whiteness of the saccharine grain depends on the quantity and integrity of the light reflected by it. When the grain is large, much of the light is intercepted or coloured in its progress by reflection from the posterior surface of the crystal; but when the grain is small, the rays of light pass through a thin stratum of crystal, and are less coloured and intercepted. Every one knows that a crystal of sugar-candy very brown in mass affords particles of a lighter hue as they are comminuted. Finely-ground brown sugar-candy yields a white powder. It is thus possible for the refiner, by a mere artifice, to bring the same boiling of sugar within the pale of either the double or single loaf drawback; that is, he may cause six cwt. to be equivalent in drawback to nearly seven; or, more exactly, 95*1/4* pounds to be equivalent to 112.

The skilful refiner, in working for the export trade or for crushing sugars, will always sacrifice grain to whiteness; but if for the home trade, he will steer a middle course, and study to

preserve as much spangle and grain as are compatible with a certain marketable shade of colour.

Another means, and a more legitimate one, of increasing the refiner's product of loaf sugar equal to the double standard, is by using a large proportion of animal charcoal in the clarification of the saccharine liquors. With this view, the French sugar refiners employ fully 10 per cent. of animal charcoal; but the British refiner seldom uses more than three or four per cent., being restrained by the fear of injuring the sparkling grain. With pure animal charcoal, the fear is, I believe, groundless; but this article, as found in the market, is replete with many falsifications.

The French refiner has an advantage by usage in estimating the tares of sugar hogsheads for payment of duty. He is allowed eighteen per cent. on the gross weight, though twelve is the true tare. By our Custom-house practice the refiner is allowed merely the average tare.

After the most solicitous and unremitting attention which I have devoted to the sugar refining in conducting these experiments during the last twenty months, I have been led to conclude that the economy of human labour and of raw material in sugar-houses in general is much inferior to that practised in the other great chemical manufactories with which I have been long versant.

The filth or impurities in raw sugar of average quality seldom amounts, by careful analysis, to more than one per cent, and yet the loss or waste in a refinery is seldom less than four per cent.; indeed, if the syrups be repeatedly turned over to obtain the maximum extract in loaf and lump sugar, the loss may amount to five or six per cent. under the most careful manipulation. It is not my business, nor is it the purpose of this Report, to describe my notions of the scientific economy of a sugar-house; but it is my duty to explain the probable origin of the loss by weight unavoidably sustained in some of my operations, conducted in the usual manner by apparently diligent workmen. Though my inspection, as well as that of the Custom-house officer, was unsparingly exercised, yet the loss in two cases is such as no analy-

tical chemist can consider without strong suspicions of unfair dealing with the process.

The leading sources of loss are the following :

1st. The quantity of blood habitually employed in the majority of refineries, for clarifying the saccharine solutions, is so great as to form, along with the bone black, a very bulky glutinous mass, which, though twice washed in boiling water and squeezed each time through the scum-bags, still retains a quantity of sugar, too small, perhaps, to pay for the price of extraction on the common plan, but great enough to create a notable deficit in an extensive train of operations. This deficit may be increased occasionally in no trifling degree by the negligence, awkwardness, or fraud of the pan-man entrusted with the scum operation. I know two London refiners who are so much on their guard against this source of waste, that they subject their washed scum to the action of an hydraulic press before they lose sight of it. By comparing the boilings of my third experiment, where the loss was ordinary, with those of my sixth experiment where it has been extraordinary, I am satisfied that the scums were washed in both cases with equal care. Indeed, the rigid superintendence under which the workmen were placed, must have prevented any deviation from the established routine of washing the scum.

2d. In filling the moulds, more or less sugar is wasted, because the granulating syrup is lifted from the cooler by a ladle into basins, which are carried to a certain distance and then emptied by hand,—a very awkward operation.

3d. The main source of waste lies, however, I believe, in the management of the moulds ; these are made of earthenware, are somewhat porous, and require to be saturated with water by immersion in the mould cistern, before they are filled with the boiled sugar. This soaking prevents the adhesion of the sugar-loaf to the inside of the mould, which would endanger the damaging of their surface or skin, and lessen their marketable value. But the water thus introduced each time attracts to it a certain portion of sugar, which is dissolved out again at the next

immersion in the cistern ; and hence the cistern water exhibits from time to time unequivocal signs of fermentation from the saccharine matter it receives.

4th. In clearing the loaves in the moulds, the syrup which drains off falls into earthen pots of a certain porosity ; so that when a few tons of sugar are distributed over one thousand moulds and pots, a certain loss must be sustained, even supposing no liquor to be spilled.

These sources of waste existed pretty equally in all my experiments, and therefore I cannot comprehend how such a defalcation of bastards and treacle should occur in the fifth experiment, but especially in the sixth, while the system of operations was unchanged. I must now mention a circumstance which militated against the full success of all experiments on the partial scale of our operations. Each set of sugar-loaves is usually treated with three clays or three liquorings of fine syrup, after the green syrup has spontaneously run off. Each clay gives birth to its peculiar order of syrup, called that of the first clay, of the second, and of the third, which last is termed also drips. Each of these should be kept apart and boiled up by itself along with more or less clarified sugar, to give grain and colour. On our scale of experiment, however, we seldom could collect a sufficient body of *like* syrups to constitute a separate boil or filling, without waiting so long as to endanger their soundness ; for the sooner syrups are worked up after draining, the better product do they give. With what regularity and dispatch I have studied to discharge this duty, will appear from the independent record of all our transactions punctually kept by Mr. Morgan, the Custom-house officer in daily attendance.

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**New Patents**

**SE A L E D I N E N G L A N D ,**

1834.

To William Garrod, of Davenham, in the county of Chester, gentleman, for his invention of improvements in manufacturing salt.—Sealed 25th January—6 months for enrolment.

To Neil Arnott, of Bedford-square, in the county of Middlesex, esq., for his invention of certain improvements on metallic pens and on pen-holders.—Sealed 25th January—6 months for enrolment.

To Benjamin Hick, of Bolton-le-Moors, in the county of Lancaster, engineer, for his invention of certain improvements in locomotive steam carriages, parts of which improvements are applicable to ordinary carriages, and to steam engines employed for other uses.—Sealed 25th January—6 months for enrolment.

To George Alexander Miller, of No. 179, Piccadilly, in the parish of St. James, Westminster, in the county of Middlesex, wax-chandler, for his invention of an improvement in lamps.—Sealed 6th February—2 months for enrolment.

To Benjamin Dobson, of Bolton-le-Moors, in the county of Lancaster, machinist, and John Sutcliff and Richard Threlfall, of the same place, mechanics, for their invention of certain improvements in machinery for roving and spinning cotton and other fibrous materials.—Sealed 6th February—4 months for enrolment.

To Jacques Francois Victor Gerard, of Redmond's-row, Mile-end, in the county of Middlesex, for certain improvements in the means of finishing silks, woollen cloths, stuffs, and other substances requiring heat and pressure, being a communication from a foreigner residing abroad.—Sealed 8th February—6 months for enrolment.

To William Stedman Gillett, of Guildford-street, in the county of Middlesex, esq., for his invention of certain

improvements in guns and other small arms.—Sealed 8th February—6 months for enrolment.

To William Marr, of No. 33, Bread-street, in the city of London, ironmonger, for his invention of an improved method of making and manufacturing of all kinds of copper, iron, tin, and other metal safes and boxes, and repositories, with metal and mineral and other means, so as to afford the most perfect security against fire to deeds, documents, and property contained therein.—Sealed 13th February—6 months for enrolment.

To Samuel Hall, of Basford, in the county of Nottingham, cotton-manufacturer, for his invention of improvements in steam engines.—Sealed 13th February—6 months for enrolment.

To Thomas Griffiths, of Birmingham, in the county of Warwick, tin-plate worker, for his invention of an improvement in the manufacture of tea kettles and other articles now usually made of copper, copper tinned, or plate iron tinned, or any other metal or metals.—Sealed 15th February—2 months for enrolment.

To Miles Berry, of the Office for Patents, 66, Chancery-lane, in the parish of St. Andrew, Holborn, in the county of Middlesex, engineer, for certain improvements in machinery or apparatus for shaping and forming metal into bolts, rivets, nails, and other articles, parts of which improvements are also applicable to other useful purposes, being a communication from a foreigner residing abroad.—Sealed 19th February—6 months for enrolment.

To James Smith, of Deanstone-works, in the parish of Kilmadock, in the county of Perth, cotton-spinner, for his invention of certain improvements in machinery used in the preparing and spinning of cotton, flax, wool, and other fibrous substances.—Sealed 20th February—6 months for enrolment.

To George Haden, of Trowbridge, in the county of Wilts, engineer, for his invention of certain improvements in the machinery applicable to the manufacturing of woollen cloth.—Sealed 24th February—2 months for enrolment.

NEWTON and BERRY,  
Patent Office, 66, Chancery Lane.

## CELESTIAL PHENOMENA, FOR MARCH, 1834.

D.	H.	M.	D.	H.	M.
1			15		Clock before the ☽ 9m. 11s.
—			16		☽ passes the mer. 8h. 48m.
—					Occul. ε Tauri im. 9h. 24m.
					em. 10h. 25m.
1 19 38	☽	in ascending node.	17 22	♂	in conj. with γ in ν diff.
2 0 14	☽	in ☐ or last quarter.			of dec. 1. 28. S.
5		Clock before the ☽ 11m. 47s.	18 1 2	☽	in ☐ or first quarter.
—		☽ passes the mer. 21h. 19m.	18 13 24	☽	stationary.
7 19	☽	's third sat. will emerge.	20		Clock before the ☽ 7m. 43s.
6 8 54	☽	in perihelion.	—		☽ passes the mer. 8h. 13m.
17 33	♂	in conj. with the ☽ diff. of	5	♂	in conj. with δ in Capri.
		dec. 2. 5. N.			diff. of dec. 1. 29. S.
7 13 41	♀	in sup. conj. with ☽	14 5	☽	enters Aries.
17 43	☿	in conj. with ☽ diff. of	21	Mer. R. A. 0 h. 39 m. dec.	
		dec. 3. 20. N.		8. 0. N.	
8		Mer. passes the mer. 1h. 12m.	—	Ven. R. A. 0 h. 15 m. dec.	
—		Venus passes the mer. 0h.		0. 17. N.	
		13 m.	—	Mars R. A. 21 h. 40 m. dec.	
—		Mars passes the mer. 21 h.		15. 11. S.	
		56 m.	—	Vesta R. A. 0 h. 4 m. dec.	
—		Jup. passes the mer. 8h. 6m.		4. 58. S.	
9		Mer. R. A. 0 h. 17 m. dec.	—	Juno R. A. 19 h. 23 m. dec.	
		4. 1. N.		9. 59. S.	
—		Ven. R. A. 23h. 21 m. dec.	—	Pallas R. A. 8 h. 31 m. dec.	
		5. 44. S.		2. 58. S.	
—		Mars R. A. 21 h. 8 m. dec.	—	Ceres R. A. 9 h. 56 m. dec.	
		17. 57. S.		28. 52. N.	
—		Vesta R. A. 23 h. 42 m. dec.	—	Jup. R. A. 2 h. 20 m. dec.	
		7. 6. S.		13. 2. N.	
—		Juno R. A. 19 h. 10 m. dec.	—	Sat. R. A. 12 h. 33 m. dec.	
		10. 52. S.		0. 42. S.	
—		Pallas R. A. 8 h. 29 m. dec.	—	Georg. R. A. 21 h. 48 m. dec.	
		8. 0. S.		13. 58. S.	
—		Ceres R. A. 10 h. 4 m. dec.	21 0	☿ in conj. with γ Virginis,	
		28. 47. N.		diff. of dec. 0. 8. N.	
—		Jup. R. A. 2 h. 11 m. dec.	23 22 44	♂ in conj. with ♀ diff. of	
		12. 10. N.		dec. 0. 32. N.	
—		Sat. R. A. 12 h. 36 m. dec.	24 12	☽ in perigee.	
		1. 4. S.	24 16 28	☽ in conj. with ♀ diff. of dec.	
—		Georg. R. A. 21 h. 46 m. dec.		5. 3. N.	
		14. 11. S.	18 13	Ecliptic oppo. or ☽ full moon.	
7 37	☽	's first sat. will emerge.	22 12	☿ in conj. with the ☽ diff. of	
21 19	♀	in conj. with the ☽ diff. of		dec. 2. 30. S.	
		dec. 3. 43. N.	25	Clock before the ☽ 6m. 11s	
23 16	Ecliptic conj. or ☽ new moon.		—	☽ passes the mer. 12h. 55m.	
10		Clock before the ☽ 10m. 33s.	26 16	♂ in conj. with ε Aquarii,	
—		☽ passes the mer. 0h. 20m.		diff. of dec. 0. 54. S.	
18	☽	in apogee.	28 2 7	☿ in opposition ☽	
11 6 8	☽	greatest elong. 18. 22. E.	6 7	☽ in inf. conj. ☽	
8 50	☽	in conj. with the ☽ diff.		—	
		of dec. 7. 42. N.		Occul. γ Scorpis, im. 15 h.	
13 18 10	☽	in conj. with the ☽ diff. of		28m. em. 16h. 22m.	
		dec. 3. 28. N.	31 13 26	☽ in ☐ or last quarter.	

THE  
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**REPERTORY**  
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**PATENT INVENTIONS.**

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*CONJOINED SERIES.*

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No. XXIV.

**Recent Patents.**

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*To WILLIAM HENSON, of the city of Worcester, lace manufacturer, for his invention of improvements in machinery for producing lace in narrow breadths with edges or quilling.—[Sealed 24th December, 1832.]*

THESE improvements in machinery for producing lace in narrow breadths with edges or quilling, consist in the adaptation to various constructions of machinery for making bobbin net lace of an apparatus or piece of mechanism which may be denominated a double headed stationary guide, with a revolving single guide and bobbin, by means of which a whipping thread is caused to travel round the two selvages or edges of the breadths of lace as it is

making, for the purpose of connecting, whipping, or lacing the selvages together, through the whole range of outside holes or meshes, in each breadth of lace.

The double headed guide, with its revolving single guide and bobbin, is represented in the accompanying drawings (see Plate VI.) in several figures, showing it in different positions.

Fig. 1, represents a cylindrical steel spindle *a*, which is hollow through its whole length, to the upper end of which the half round piece *b*, is attached by screwing, and at its top two small eyes *c*, are made, which constitute the double headed guide. A series of these guides are intended to be fixed in a horizontal bar, extending along the front of the machine, attached to the feet of the ordinary guide bar. These spindles may be placed at any required distances apart, answering to the proposed selvages, that is, according to the desired widths of the narrow strips or breadths of lace to be made; the ends *c*, or double headed guides, being respectively fixed in the situations of two of the ordinary guides, which are to be previously broken away to afford room.

Each double headed guide conducts two threads to form the selvage warps, which, along with the threads of the ordinary guides, pass from the warp-roll up to the points, and move laterally with them when the guide bars are shogged.

A tube *d*, fig. 2, fits upon and turns freely round the spindle *a*, between two shoulders, as shown in figs. 3 and 4, but more evidently in the sectional figure 5. This tube carries the whipping guide *e*, which is a thin blade of steel affixed to the side of the tube *d*, having at its upper end a small hole *f*, as a guide for the whipping thread to pass through; the whipping thread is drawn from a bobbin or spool *g*, mounted upon a stud fixed to the side of the tube

*d*, and the thread is kept in tension by a friction spring *h*, pressing upon the periphery of the bobbin, and preventing it from delivering the thread too freely.

At the lower end of the tube *d*, there is affixed an oblique toothed pinion *i*, which is intended to be acted upon by a similar oblique toothed pinion, upon a rotary horizontal shaft, extending along the front of the machine hereafter described. By means of these oblique toothed pinions taking into each other, the tubes with the whipping guides are, by the driving motions of the machine, at proper intervals, made to perform half rotations, which cause the guides to carry the whipping threads round the two selvages of the breadths, and to lace or connect the outer meshes together by a zig-zag line of thread, as the net is produced and drawn upwards by the progressive rotation of the work roller. Having explained the construction of the stationary double headed guides, and of the single rotary guides for whipping the threads round the selvages, I proceed to show their situations in a lace-making machine, and the means by which they are made to operate.

Fig. 6, is a section taken transversely through a lace machine, constructed upon what is technically called the double tier circular bolt principle; and fig. 7, is a front view of the same machine, in which the new parts are shown adapted to the ordinary mechanism, and marked by small italic letters; but for the better illustration of the subject, the principal operative parts of the machine are represented on a larger scale in the section and front view of the working portions of the same machine at figs. 8 and 9.

In the last mentioned figures (the old parts being marked by capital letters) A, represents the warp roller on which the warp threads are wound; B, B, are the guides that conduct the warp threads fixed to the guide bars J, J, as usual; C, C, are the points for taking up the half meshes

formed by the intervention of the threads; D, is the face bar which keeps the work distended; E, is the work roller slowly revolving and taking up the lace as it is made by the operations of the machine; F, F, are the bobbins and their carriages sliding to and fro in the circular bolts G, G, impelled by the vibratory action of the driving bars H, H, and the locking bars I, I; the operations of these several parts of a circular bolt machine being well understood by lace makers, no further explanation is necessary.

It is also known, that, in order to produce separations and selvages in the sheet of lace, it is necessary to remove one of the two bobbins and carriages F, from the circular bolts, and one of the warp threads opposite to the parts where the separations are to be made; the effect of which is, that the absence of such bobbin, and carriage, and warp thread, causes a break in the twisting or intervention of the threads, and, consequently, a division of the net at those parts, leaving two selvages, instead of continuing the meshes uniformly across the sheet. Now, the business of the improved apparatus is to connect these two selvages together by a whipping, lacing, or zig-zag thread, which is done in the following manner:—

The spindles carrying the stationary double headed guides and rotary guides, described above, are fixed at any desired distances apart, in inclined position, in the horizontal bar k, k, which bar is attached to the feet of the front guide bar J, and slides or shogs with it. The ends of the spindles or double headed guides c, are so situate in the machine as respectively to occupy exactly the places of two ordinary guides, which have been previously removed to make way for each double headed guide: those warp threads which are to form the selvages of the breadths of net pass from the warp roller up through the double headed guides c, c, c, and with the other warp threads conducted

by the ordinary guides B, proceed onward to the situation of the points C, C.

The traverse thread, which may be called weft, intended to be twisted round the warps, are supplied by the bobbins F, which, in sliding to and fro on the circular bolts, pass through the warps, and the bolts being at intervals shogged or shifted laterally, cause the bobbin threads to cross diagonally, giving the angular forms to the ends of the meshes of the net.

The operative parts of the machine being now put in action, the back driving bar H, descends, pushing the double tier of bobbins and carriages F, forward; but there being only a single bobbin and carriage F\*, in such gates of the bolts as are opposite to the intended separations in the net, the back driving bar moves through half its course before it comes in contact with this tier of selvage carriages; and to prevent any of them springing forward with the other carriages, a small finger or stop l, is raised at this time in front of each selvage carriage F\*, as seen in fig. 8, and by dots in fig. 9, where the stops are partially hidden by the guide bar, but they are shown detached at fig. 10.

At this period of the operation there is a momentary pause in the progress of the driving bars, which space of time is occupied by the rising of the lockers I, I, as shown by dots in fig. 8, for the purpose of taking hold of the toes of the carriages of both tiers, and drawing them asunder, free from the warp threads in the middle, while the guides are moved laterally to produce the twist. When this is done, the lockers I, I, fall instantly, the stoppers l, also descending, and the back driving bar H, proceeds, pushing the whole of the back bobbins and carriages forward through the warp. At this period the lockers again rise, and both tiers of carriages and bobbins are drawn by the front locker bar up from the centre, free from the warp

threads, into the gates of the front circular bolts G. The guides now shog again, and, by similar movements of the bars, the bobbins and carriages are all driven back again into the gates of the back circular bolts. After shogging the guides a third time the bobbins are advanced, as before, into the gates of the front bolts, which three vibrations or series of movements produce a range of half meshes of net, the warp and bobbin threads being by such movements twisted together, except at the parts between the selvages, which are to be connected by the whipping or lacing threads.

At this stage of the movements the rotary guides e, e, e, are made to revolve to the left hand, half way round the stationary double headed guides c, c, c, for the purpose of passing the whipping thread from one mesh to the other, over the space between the selvages. After this, three vibrations or movements of the bobbins and carriages and warp threads again take place, as described above, which completes the formation of the meshes, when the whipping guides e, perform the other half of their rotation, having by these means embraced the twisting threads of warp and weft at both selvages, and thereby whipped or laced the breadths together through the outer holes or meshes. As the movements of the machinery go on after every three vibrations of the bobbins and carriages, the whipping guides e, e, e, turn half round the double headed guides c, c, c, as described, and so continue lacing the breadths together by a zig-zag thread, which may be readily drawn out when the lace is finished.

It is obvious that the driving of the whipping guides half way round at intervals might be effected by various mechanical means, to any particular one of which I do not intend to confine myself, but the methods shown in figs. 8 and 9, I prefer.

Having mounted the series of stationary double headed

guides by screwing them to a longitudinal bar *k*, *k*, as described, I place above this a longitudinal shaft *m*, *m*, turning in bearings, upon which shaft are fixed a series of oblique toothed pinions *n*, *n*, *n*, corresponding with and taking into the oblique toothed pinions *i*, *i*, *i*, at the lower ends of the tubes *d*, *d*, *d*; hence, by the rotation of the shaft *m*, the tubes *d*, with their whipping guides *e*, are all driven round.

At one extremity of this shaft *m*, is fixed the toothed wheel *o*, taking into the larger toothed wheel *p*, on the short axle *g*. This axle has also affixed upon it an oblique toothed wheel *r*, which is acted upon by the rim or edge of a snail or excentric cam *s*, fixed on the top of a shaft *t*, standing in the machine at a slight inclination from the perpendicular, as shown in the section and front views of the complete machine in figs. 6 and 7. In these last mentioned figures it will be seen that when rotatory motion is given to the main shaft *L*, *L*, extending along the lower part of the machine by a band and rigger *M*, a pinion *N*, near the left hand end of this shaft, drives the toothed wheel *o*, upon the axle of which the bevel wheel *u*, is fixed; and that this wheel *u*, by taking into a pinion *v*, fixed upon the shaft *t*, gives to that shaft, and to the parts above, the required motion.

It will now be seen that when the ordinary movements of the machine are going on, that the shaft *t*, will continue turning with a uniform rotation, but that the peculiar form of the snail or excentric cam *s* (shown in a plan view in the detached figure), which is fixed on the top of this shaft *t*, and acts upon the oblique toothed wheel *r*, will cause that wheel to make an escapement of one tooth only at every revolution of the shaft *t*; the effect of which will be that the wheel *p*, will be driven through only so much of a revolution at each escapement as will be sufficient to turn

the wheel *o*, with its shaft *m*; and pinions *n*, half a revolution, and consequently to drive the tubes *d*, with their rotary whipping guides *e*, *e*, *e*, half round the double headed guides at the required intervals, that is, immediately before the rising of the points to take up the half meshes of net.

This driving of the whipping guides half round the double headed guides at intervals, might be effected by various other mechanical contrivances already well known; it is not, however, necessary to describe them.

As a preventive to guard against the accidental springing forward of the traverse carriages and bobbins *F*\*, when they are required to be stationary, I have, as before said, introduced the stops *l*, between the guide bars *J*, *J*, shown in operation in fig. 8, and detached at fig. 10.

These stops are attached to a bar *w*, *w*, which rises and falls upon parallel joints that connect it to a fixed bar *x*, *x*, extending along the machine below the guide bars. At the end of this bar *w*, there is a link or arm *y*, connected to a lever (seen in fig. 7), which lever is acted upon by the inequalities upon the periphery of a cam wheel *z*. In this way the bar *w*, with its series of stops *l*, is at the proper periods raised up for the purpose of introducing the stops before the toes of the traverse carriages.

In conclusion, my invention of "improvements in machinery for producing lace in narrow breadths with edges or quilling," is the construction and adaptation to a machine for making lace of an apparatus consisting of a stationary double headed guide, to be mounted in the machine in any eligible way, the double headed guide standing fixed in the situation of two of the ordinary guides, and of a whipping guide and spool, which is to carry and conduct a thread, and to travel round the stationary double headed guide by any convenient means, for the purpose of lacing, whipping, or connecting by means of such threads

the edges or selvages of two breadths of net together, not confining myself to the precise form of the stem which supports the double headed guide, as shown in the drawings, nor of the travelling guide and spool, nor to any certain number of these apparatus which may be employed in one machine. And though I have shown my improvements as adapted to a lace-making machine on what is called the "double tier circular bolt principle," yet the same is also applicable to various other principles or constructions of machinery for making bobbin net, provided the double headed guides are placed in such machines in the situations of the ordinary guides, at those parts where the selvages of breadths are to be formed and connected together; which adaptation of the improvements to other constructions of machinery for making bobbin net lace, I also claim.—[*Enrolled in the Rolls Chapel Office, June, 1833.*]

Specification drawn by Messrs. Newton and Berry.

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*To WILLIAM RHODES, of the Grange, Leyton, in the county of Essex, brickmaker, for his invention of an improved manufacture of bricks for building purposes.—*  
[Sealed 14th February, 1833.]

THE Patentee describes his improvement in the manufacture of bricks to consist in the use of pulverised coke, to be mixed with the clay instead of the coal ashes usually employed in the process of mixing brick earth, and explains his mode of carrying this invention into effect in the following manner:—

"I proceed in the usual mode to manufacture my bricks until arrived at that process which is in the trade called

soiling the earth, and instead of soiling the brick earth with ashes, or what is called London soil, small coal, or a mixture of these substances, or as has been sometimes done with a mixture of coke ashes with London soil, the coke ashes not being pulverised, and bearing but a small proportion to the other ashes or soil, I proceed to soil my brick earth with finely pulverised coke only, in the proportion of one inch and three quarters depth of pulverised coke over one foot depth of brick earth."

The Patentee proceeds then to state that the finest sieves now in use for sifting the soil are composed of meshes formed of wire, and of an oblong shape, being three-sixteenths of an inch by two inches long, whereas the sieves now proposed to be used are one-eighth of an inch square; the consequence of which, and the use of pulverised coke, the Patentee states is, that he avoids the internal honeycomb appearance of the ordinary brick when broken.

The coke to be used is pulverised either by crushing the large pure coke between rollers, and sifting it, or else by sifting coke breeze, and using the fine particles sifted out of the breeze, or the coke or breeze may be broken or bruised by hand, and then sifted; and it is proposed that none should be used to soil the brick earth with except that portion which is fine enough to pass through the description of sieve commonly called No. 2, although coarse will answer the purpose, but not so well, as the finer it is the better it will effect the object intended.

It may be as well here to observe, that in order to use the sieve No. 2, to advantage, it should be kept as dry as possible, as also the coke, for which purpose the sieves in damp weather should be placed before fires to heat and dry them, and the coke should be kept under cover.

The Patentee states, in conclusion, that he claims as his

invention and improvement soiling the brick earth used in making bricks for building purposes, either wholly with pulverised coke obtained in manner aforesaid, or otherwise, or with pulverised coke mixed with other firing.—[*Enrolled in the Enrollment Office, August, 1833.*]

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*To ROBERT SMITH, of the Abersychan Iron Works, in the parish of Trevethen, in the county of Monmouth, gentleman, and JOHN WALKINSHAW, of the same place, engineer, for their invention of an improved rail for railways.—[Sealed 10th August, 1833.]*

THIS invention consists in making or constructing wrought or malleable iron rails for railways, with feet or pedestals, formed in one piece with the rail itself, and projecting from the sides and base or bottom part thereof, and which projecting pedestals or feet are intended to support the rails in their proper positions upon sleepers or blocks of stone or wood, and are intended to be used in place of ordinary chairs or pedestals of the common rails.

In the usual mode of constructing railways, the rails and chairs or pedestals are made separate, and after the latter have been fastened to the rails by keys, wedges, or otherwise, the whole is secured upon the sleepers or blocks of wood or stone by bolts, pins, or screws passed through the chairs.

In another construction of railways, the base or bottom part of the rail is made much broader than those above mentioned, and of a uniform breadth from end to end of the rail, and of sufficient width to allow of its being fastened to the sleepers without the use of chairs.

In the improved rail, those parts which are to answer the

purpose of the ordinary feet or pedestals project beyond the width of the base or bottom of the rail only at intervals, that is, at those parts where the common chair would be used for its support, whereby a saving of material will be effected, and at the same time a more perfect and simple mode of fastening the rails to the blocks or sleepers be obtained, and consequently a saving of expense and labour in the constructing of a railway.

In the accompanying drawings (see Plate VI.), fig. 11, represents a side elevation of a part of one construction of the improved rails when complete, and ready for fixing upon the blocks or sleepers. Fig. 12, is a top or plan view of the same : fig. 13, is a representation of the bottom or base of the rail, as it would appear when seen at its under side : fig. 14, is a transverse vertical section taken through the rail : and fig. 15, is a similar section taken through the rail at its before-mentioned projecting parts : *a, a*, is the top of the rail upon which the carriage wheels are intended to run ; *b, b*, are the projecting parts or feet or pedestals formed upon the sides of the rail, and through which the bolts, pins, or screws used for securing the rail upon the sleepers or blocks are intended to pass ; *c*, is the base or bottom part of the rail.

Having stated the leading features of the invention, the Patentees proceed to describe the manner or method in which they propose to carry the same into effect ; but they do not intend to confine themselves to the precise mode or method hereinafter specified, as it may be found necessary to make considerable alterations in the same, according to the form of projections which it may please the manufacturer to adopt.

In making or forming these improved rails it is intended to use bars or pieces of wrought or malleable iron of suitable shapes and lengths, and which bars or pieces, after

being properly heated and prepared, are to be formed into the improved rails by being passed through rolls or rollers, having proper shaped grooves and indentations upon their peripheries for forming the projecting feet or pedestals, and which rolls or rollers are similar in their construction (except in the parts for forming the projecting feet or pedestals) to those commonly used in iron-works for making rails without supports.

In forming these rolls or rollers, in addition to the usual grooves in their peripheries, one or more indentations or excavations must be made in one or more of the grooves, for the purpose of producing the pedestals or projecting feet at certain parts on the rails, and the other grooves must be made deeper than is usual for common rails in those parts which are intended to form the base.

The number of the indentations must be dependent upon the diameter of the rolls, and the shape or size and distance apart of the projecting feet or pedestals. Fig. 16, is a representation of a pair of metal rolls or rollers intended to be mounted in bearings or standards as usual, and worked by any adequate power. These rolls or rollers are furnished with proper grooves and indentations suited to the size and shape intended to be given to the bar of iron in the progressive operations performed in rolling out the improved rails.

This piece or bar of iron of suitable shape, after being properly heated and prepared, is first passed through the grooves A, B, when it will be rolled or forced into the shape of the open space *d*, between the peripheries of the grooves. It is next passed through the grooves C, D, when it will be made to take the shape of the open space *e*, between the peripheries of the grooves. The bar is then passed through the grooves E, F, which will cause it to take the shape of the open space *f*, between those grooves, and be ready for

the next pair of grooves G, H, where the projecting feet or pedestals are to be formed upon the rail by reducing and extending the parts of the sides and base between them.

A portion of the rail in this state is shown in fig. 17, which is a vertical section taken transversely through the rolls in the direction of the dotted line on the sides of the grooves G, H, in fig. 16.

After the bar of iron or unfinished rail has passed through the grooves G, H, it is next to be conducted between one or both the pairs of grooves I, J, and K, L, which are intended to complete the rail, but not materially to alter the shape of the projecting feet or pedestals, as the latter grooves are principally used for rolling out or elongating the rail, and finishing the upper part in the usual manner of rolling common rails.

In case the surfaces of the upper part of the rail and its projecting feet or pedestals should not be parallel to each other after the last rolling, the rails may be passed through the grooves M, N, when the periphery of the grooves will set the upper surface of the rail and the under side of the feet and base parallel.

In manufacturing these improved rails, when they are required to have a narrow base or bottom part, it may be desirable to pass the unfinished rail through a second pair of indented grooves, as the reduction of the iron from the breadth of the feet or pedestals to the intermediate base or bottom may be found too great to be properly effected by passing it through only one pair of rollers. In this case two or more pairs of rollers with indented grooves may be employed; but care must be taken, in passing the unfinished rail through the second or following pair, that the heated iron be so inserted into the open space between them, that the projections or feet formed by the first pair of

indented grooves may meet and go into the indentations in the next or following pair.

This part of the operation will be greatly facilitated by taking care to insert in the first instance one end of the bar of iron into the indentations of the first pair of grooves; and afterwards inserting the same end with its projections or feet upon it into the indentations of any subsequent pair.

It may also be found convenient at times to raise and depress the upper roll, which can be done by means of adjusting screws in the bearings or standards as usual; and putting the piece of iron back into the furnace and reheating it, at some convenient part of the operation, may also be frequently found useful.

Fig. 18, is a vertical section taken transversely through a pair of indented grooves intended to be used in the first rolling of the bar of iron, in which a part of the iron or unfinished rail is shown under operation; fig. 19, is another similar section of the second pair of grooves, with a part of the unfinished rail, as delivered from the grooves at fig. 18; passing through them, and undergoing a further reduction and elongation.

In the second pair of grooves there are only two indentations in their peripheries, and these grooves must be of such a size and form that the same part of the iron may pass into each indentation as between the indentations in the first pair of grooves, and that the projecting pedestals or feet of the unfinished rail may pass into the indentations, though the intervals between them will have become greater; and the piece of iron have been lengthened.

Having now explained the manner or method of forming these improved rails for railways, I shall proceed to describe some variations in the shapes or forms of them. Fig. 20, is a representation of the upper side of a portion of one of the improved rails, in which the projecting feet or pedestals

are formed on different sides of the rail, but at distances from each other, as shown in the figure, from which it will be understood that the indentations in the grooves for forming this description of rail will not be placed opposite to each other.

Another description of the improved rails is represented in different forms in the figs. 21, 22, 23, 24, 25, 26, and 27, the projecting feet or pedestals of which are formed by pressing and extending outwards at intervals the lower part of the rail, while the upper part will be maintained in its usual straight direction. The lower part of the rail, at the places where the pedestals are to be formed, will be turned from a direct line into curves on each side, thereby forming hollow feet or standards, which will have a steady bearing upon the block or sleeper, and which construction of rails will generally require less iron than the last described.

These projecting feet or pedestals may be made of different shapes and projections, and at different intervals. We intend to form them by passing the iron or rail through and between rolls furnished with grooves and with indentations and projections working into or opposite each other, as shown in the sectional diagram fig. 28, of a pair of grooves applicable to the rolling of this description of rails.

It is intended to make these indentations and projections in the last or finishing groove, and in the previous rolling to employ similar grooves to those commonly used, except that it will be proper to have those parts of the grooves which form the lower part of the rail of rather greater depth than usual, in order that a greater thickness of iron may be brought to be operated upon in the finishing groove.

To straighten these rails after they are delivered from the finishing groove they may be put, while in a hot state, into long cast iron troughs or boxes, and fastened near

their ends to the boxes by wedges, as is now sometimes done with common rails; being thus firmly held at the ends while the middle part is free, the contraction in cooling will draw them straight.

Figs. 21, 22, and 23, are representations of the base or bottom part of different shaped rails as they would appear on their under sides; fig. 24, is a side elevation; fig. 25, is a top or plan view; fig. 26, is a transverse vertical section taken through a rail; fig. 27, is another similar section taken through the rail and one of the projecting feet or pedestals.

It will be obvious to persons acquainted with the working of iron, that these last described hollow projecting feet or pedestals may be formed by first rolling the rail without the projections, and then submitting it in a heated state to the action of a stamping press, or to the operation of swadging tools and countersunk dies, by manual labour, by means of which the portions of the base or bottom part of the rail may be forced outwards from the straight line, and form the projecting feet or pedestals.

In cases where it might be thought desirable, a greater number of pedestals may be formed upon our improved rails than it is customary to use in the construction of an ordinary railway, some of which may not require to be fastened upon blocks or sleepers, but which may help to keep the rail in its proper position by resting upon the ground.

Having now explained the nature of our said improvement, and the manner in which the same is to be performed, we wish it to be understood that we do not mean or intend to claim as our invention any of the parts herein described for the purpose of explaining our said improvement, which are old, or have been before used in the construction of railways, or in rolling or manufacturing iron rails; nor do

we intend to confine ourselves to the precise mode or method herein described of carrying our improvement into effect; but whereas we claim as our invention a wrought iron rail for railways, having parts projecting from the base thereof at various intervals, answering the purpose of the ordinary feet, pedestals, or chairs, and which parts so projecting as aforesaid are made in one piece with, and, in fact, form a part of the rail itself, as hereinbefore described.—  
 [Enrolled in the Rolls Chapel Office, February, 1834.]

Specification drawn by Messrs. Newton and Berry.

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To RICHARD BUTLER, of Austin Friars, in the City of London, merchant, for his improvements in manufacturing, obtaining, or producing oil from certain substances, and in extracting, producing, or obtaining gas from the same or such like substances, or from oil produced therefrom.—[Sealed 29th January, 1833.]

THE substances from which the Patentee proposes to extract oil and gas are bituminous schistus, or shale and slate (not including slate coal) and bituminous sand-stone; which substances, the Patentee states, when pure, do not usually cake if ignited or thrown into a good fire, and which, by distillation or carbonisation (as will be hereafter described), give an oil and gas free from naphthaline.

The process for extracting the oil and gas from the mineral substances is described in the following manner:—  
 “The above-named substances are to be broken into small pieces (at the same time care should be taken to separate therefrom any heterogeneous matters, such as clay or pirites); they are then put into a retort, such as is commonly

used in making gas from coal, which is to be about half filled with the broken pieces.

These retorts are provided with two apertures, to which are connected pipes furnished with cocks, so that they may be opened and shut at pleasure. Each of these pipes at their other extremities are inserted into a close vessel or recipient placed in a tub or tank, a second pipe connects the first recipient to a second recipient, and a third pipe joins the second recipient to a third.

By these means there are to each aperture of the retort a distinct set of recipients, both of which sets must be made air tight.

The third recipient in one of these sets is provided with a pipe leading to a gasometer, and the third vessel in the other set has a pipe connecting it to a worm or refrigerator, which opens into a fourth vessel or recipient, from which there is another pipe connecting the last mentioned or fourth recipient with the same gasometer, so that no gas may be lost; but the gas obtained in this set of vessels will not be found so pure as the gas obtained through the second.

Several retorts may be arranged so as to work into two gas mains or pipes, each of which will be connected by a smaller pipe to one of the two apertures with which each retort is provided. By this arrangement two sets of vessels will serve for each set of retorts, and the cocks are to be placed on the main pipes so as to open or shut them at pleasure.

After a gentle fire is made in a furnace of the usual construction under the retort or set of retorts, and the cock placed on the pipe of that apparatus which is not connected with the worm or refrigerator shut off, the other cock remaining open, the operation will soon begin. In the first instance a watery vapour issues from the retort,

next a yellow oily vapour, both of which are carried into the several recipients of the apparatus, where they are condensed, the most volatile of the oily particles being carried into the worm.

As soon as the oily particles become of a darker colour, and are obtained from the retorts unmixed with water, the cock belonging to this apparatus is then shut, and the cock belonging to the other apparatus is to be opened, at the same time the fire is to be increased, so as to bring as soon as possible the retort or retorts to a red heat. The means by which the colour of the vapour is observed, is by having a piece of glass let into the pipe leading from the retort.

In this stage of the process oil is obtained from the retorts with a large quantity of gas, which flows into the gasometer, whilst the oil is condensed in the several intermediate recipients. By this method oils of different density are obtained, those contained in the worm apparatus being more volatile than those obtained in the other apparatus.

This difference should be attended to in the process, as it is desirable not to mix them together. These oils may be designated as *oil number one* and *oil number two*, the oil No. 1, being the most volatile. Water may be used in the tanks or tubs in which the recipients are placed for more quickly condensing the products, which is the course generally pursued, although it might be preferable to put some water in the retorts. This is not absolutely necessary, as before observed ; but the materials may be dried, and even slightly charred, before they are thrown into the retorts ; and, when the principal object is to obtain gas, they should be carefully dried before putting them into the retorts, which should be brought as quickly as possible to a red heat.

In the several vessels within which the oils No. 1 and No. 2, are condensed, the oils are mixed at the time of

coming over with ammoniacal water, and a small quantity of heterogeneous substances, particularly the oil No. 1 ; but they quickly separate, and the oil floats upon the surface of this water. With respect to oil No. 2, when care is observed, it should come over free from water.

The oils so produced may be said to be in their rough state ; and subsequently, the most approved methods for purifying oils may be applied to the purification of these oils ; for instance, working them with sulphuric acid, filtration, and distillation.

These oils in their rough state (but it is preferable they should first undergo some degree of purification) may be manufactured into gas by any of the methods, processes, and apparatuses by which other oils are usually converted into gas. The oils No. 1 and No. 2, in their rough state, are often found entirely free from oxygen ; and if obtained by the above process, do not contain so much as the coal tar obtained in coal gas-works, where the coal is thrown into retorts already brought to a red heat. These oils in their rough state are further distinguished from coal tar by their containing no napthaline, and moreover, the oil No. 2, offers another characteristic feature.

If, after being drawn off and distilled, and if, in this latter process, the more volatile or first proceeds, say one half, of the quantity acted upon be set apart, and the remaining half be exposed to a low temperature, there will soon appear in this part of the distilled oil No. 2, small flakes of a white odourless and light substance, which is a compound of carbon and hydrogen.

The gas (prior to any purification) whether obtained from the oils aforesaid, or directly from the said minerals, is distinguishable from coal gas (also in its unpurified state), by its being free from napthaline. In some instances, when the materials are found stratified in or

embedded with coal, or otherwise, and happen to be impregnated with portions of naphthaline, the bituminous schistus, or shale and slate and bituminous sand-stone, will not then be in a pure state, and, after trial, should not be used.

It will only be desirable, further to add, that the gas (whether produced direct from the above-mentioned materials, or from the oils obtained therefrom, as above described) may, and indeed will, in most instances, require purifying before being used, as a means of producing light; and in order to purify the same, it will be necessary (as is the practice in gas-works) to pass it through water, and if particularly impure, then it will be desirable that such water should contain lime, as is well understood.

The Patentee concludes by saying,—“Having now described this invention, it will be evident that the apparatus herein described for producing oil and gas from materials hereinbefore mentioned, forms no part of the invention, they being in themselves well known and in use, and the same may be varied; but he claims as his invention, first, the production of oils, by distillation or carbonisation, from bituminous schistus, or shale and slate (not including slate coal) and bituminous sand-stone, as above described; and, secondly, in the production of gas for illuminating purposes from such oils, or direct from the bituminous schistus, or shale and slate (not including slate coal) and bituminous sand-stone, as above described.”—

[*Inrolled in the Inrolment Office, July, 1833.*]

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To WILLIAM KING WESTLEY, of Salford, in the county palatine of Lancaster, flax spinner, and SAMUEL LAWSON, of Leeds, in the county of York, machine maker, for their invention of certain improvements in machinery or apparatus for preparing, drawing and roving hemp, flax, wool, and other fibrous substances.—[Sealed 20th August, 1833.]

THESE improvements in machinery or apparatus for preparing, drawing or roving hemp, flax, wool, and other fibrous substances, apply to that particular construction of machinery commonly called or known by the name of *the Gill*, employed for opening, straightening, and separating the fibres of flax, hemp, long wool, and other materials of a similar description in the operation technically called slivering. The particular feature or improvement consists in a mode or method of driving the heckle bars through the gill machine by means of perpetual screws or worm shafts, instead of employing chains and spur wheels, as in the ordinary construction and mode of working gill machines.

The various parts of the machine called the gill, its objects and mode of operating, are so well known to mechanics connected with the business of dressing and preparing flax, hemp, and worsted, that a particular description of it is unnecessary; I shall therefore merely allude to such parts only as may be required for the better illustration of the improvements adapted thereto.

The heckle bars which lie across the machine are in the improved construction supported at their ends by fixed horizontal guide rails, on which they slide, the extremities of the heckle bars being inserted into the helical grooves or recesses of the worm shafts or screws, which are

placed in horizontal positions at the sides of the machine ; and hence the rotary motions given to these screw shafts cause the heckle bars to be driven along the guide rails with one uniform simultaneous movement. The heckle bars having performed their usual office, that is, combed and separated the fibres of the material as they move onward, are at the front part of the machine depressed and put out of operation by means of rotary cams ; and by the assistance of guide levers each heckle bar, when it arrives at the end of the upper horizontal guide rail, is conducted down to the lower horizontal guide rails, where the extremities of the comb bars falling into the helical grooves of a lower pair of worm shafts, revolving in opposite direction to the former, the heckle bars are by that means conducted in retrograde directions ; and when at the back end of their horizontal guide rails they are, by similar rotary cams, raised again to the upper horizontal guide rails, and these coming into gear with the upper worm shafts, they are moved onward as before.

By these means a succession of heckles are continually moving onward upon the upper guide rails, their points being in constant operation between the fibres of the materials intended to be opened or separated, and their perpendicular positions are preserved throughout their entire circuit of movement.

In the accompanying drawings (see Plate VII.) fig. 1, is a horizontal representation of a gill machine, showing the improved parts attached thereto, but in which figure some of the upper portions of the machine are removed, to display the working parts more clearly ; fig. 2, is a side view of the gill, and fig. 3, is a vertical section taken longitudinally ; in which several figures the similar letters of reference point out the same parts of the machine.

The driving rigger *a*, is fixed upon the front roller *b*,

which is commonly called the drawing roller, because, when pressed upon by the upper wooden roller *c*, the material in passing between them is drawn forward. The rollers *d, e, f*, are the ordinary back holding rollers, between which the sliver of flax, hemp, or other material is retained, and is hence drawn by the rollers *b, c*, over the needles or points of the heckle bars with considerable tension. The upper guide rail before alluded to, on which the heckle bars slide, is shown at *g*, in the section fig. 3, and the lower guide rail at *h*; the series of heckle bars, with their needles or points, are represented at *i, i, i, i, i, i*; the upper worm shafts *k, k*, are mounted in brackets affixed to the sides of the frame, and a similar pair of worm shafts *l*, are mounted in like manner below. These worm shafts *k*, and *l*, on each side, are connected together by toothed wheels *m*, and on the axles of the lower worm shafts, bevelled pinions *n*, are fixed, which take into corresponding bevel pinions on the transverse shaft or axle *o*. This shaft *o*, being connected by a train of toothed gear with the axle of the drawing roller *b*, as shown in figs. 1, and 2, the rotation of the roller *b*, causes the shaft *o*, to turn also, and the bevel gear *n*, and *o*, produce the rotary motion of the worm shafts *k*, and *l*, which turn in contrary directions.

It will be seen by fig. 1, that the ends of the heckle bars *i*, have nibs or projections which fall into the recesses of the screw or thread of the worm shafts, and that being supported beneath upon their guide rails as the worm shafts *k, k*, revolve, the upper range of heckle bars will be progressively advanced toward the front part of the machine. By reference to fig. 3, it will be perceived that as each heckle bar arrives at the front end of the guide rail *g*, a finger, tappet, or cam *p*, on the shaft *k*, strikes it down to the lower guide rails *h*, and in order that its descent may be correct and perpendicular, weighted levers *q, q*, in front,

are made to press against the face of the heckle bar as it descends. The heckle bar having now arrived at the lower guide rails *h*, its nibs or extremities fall into the recesses or threads of the lower worm shafts *l*, by the rotation of which the heckle bar is made to retrograde, that is, recede toward the back of the machine. When the heckle bar has reached the hinder end of the guide rail *h*, a finger, cam, or tappet *r*, on the lower worm shaft comes under it and raises the heckle bar, guided by the back weighted levers *s*, as shown in fig. 3, until it is elevated to the level of the upper guide rail *g*, when the threads of the upper worm shafts take hold of its nibs as before, and conduct it forward upon the guide rail in the way already described. Thus the continued rotation of the worm shafts *k*, *k*, and *l*, *l*, by the means explained, cause the whole series of heckle bars to travel along the guide rails, and the cams or fingers *p*, and *r*, by depressing and raising them at the ends of the guide rails, cause them to move in a regular circuit, yet preserving at all times their perpendicular position.

Having described the particular features of our invention, we wish it to be understood that we do not mean to confine ourselves to the precise construction and arrangement of machinery represented in the drawings, as a machine to perform the same sort of operations may be variously formed, and the parts differently disposed; but we do claim as our invention any and every mode in which screw or worm shafts may be adapted to conduct the bars carrying the needles or heckles through a machine or machines for preparing, drawing, or roving flax, hemp, wool, and other fibrous substances requiring the operations of opening, separating, and straightening of the fibres of which such material is composed.—[*Enrolled in the Rolls Chapel Office, February, 1834.*]

Specification drawn by Messrs. Newton and Berry.

*To ADOLPHE JACQUESON, of Leicester-square, in the county of Middlesex, Esq., in consequence of a communication made to him by a certain foreigner residing abroad, for an invention which he has in his possession, for certain improvements in machinery or apparatus applicable to lithographic and other printing.—[Sealed 6th July, 1831.]*

The Patentee says that this invention "consists in combining several well known parts in such manner as to produce an arrangement of machinery or apparatus applicable to lithographic printing, as well also for typographic, and copper and other plate printing."—In plain terms, it is a certain arrangement of mechanism constituting a printing press, in which there does not appear to be a single feature of novelty either in principle or operation.

In Plate VII, fig. 4, is a front elevation of the press; fig. 5, is a longitudinal elevation, both drawn geometrically. A strong framing of iron constitutes the side standards, which are braced together by suitable transverse bars and rails; *a*, is the bed roller on which the carriage of the table *b*, runs to and fro. This roller is actuated through toothed gear by the winch or handle *c*.

The stone for lithography, or the copper plate, or the form of types or blocks for letter-press printing, is to be secured on the table *b*, formed by a framing of three longitudinal bars with cross braces, having a flat plate on the top. The ribs on the roller *a*, act as carriers against the under part of the bars of the table, which is driven by toothed wheels *d*, taking into a rack by the side of the table, and it is guided by grooved wheels or rollers attached to the table carriage, which runs upon straight edges on the upper surface of the frame.

The pressure which is to give the impression to the paper

is produced by a cylindrical roller of cast-iron, or other hard and heavy material, shown in the front view at *e*, turning upon its axle, supported in the side standards, the pressure being adjustable by vertical screws.

When the machine is employed for printing from stone having only writing thereon, or when printing from a form of types in which much care is not requisite, and where quick printing is required, an endless blanket or felting passes under the printing cylinder *e*, and over the roller *f*, at top, which is made to revolve by means of a band connected with the movements of the table, the blanket being kept distended by small rollers *g*.

The rotation of the printing cylinder is effected by intermediate toothed wheels *h*, connecting the bed roller *a*, and pressing cylinder *e*, together, so that they turn simultaneously.

Additional pressure may be given to the printing cylinder *e*, by means of compound levers *i* and *k*, which, through the pendant loops *l*, are made to bear upon the ends of the axles of the cylinders; and their pressure is capable of adjustment by shifting the situation of the weight *m*, to a greater or less distance from the fulcrum.

The Patentee observes, that when quick printing is required, a different train of wheels may be employed for connecting the cylinders *a* and *e*, together, the object of which is, that a greater speed may be given to the machine; but when large and fine prints are to be taken, then the movements must be slow.

The sheets of paper are to be laid on in the usual way, and the table being run under the pressing cylinder, the impression is given; in fact, the movements are as in other presses. The concluding words are as follows:—

“ Having now described the nature of the invention, and the manner in which the same is to be performed and

carried into effect, I would have it understood that I lay no claim to any of the various parts separately; but I do claim as the invention the combination of the various parts in the manner above described.—[*Enrolled in the Enrollment Office, January, 1832.*]

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*To SAMUEL PARLOUR, of Croydon, in the county of Surrey, gentleman, for certain improvements on lamps, which he denominates Parlour's improved table lamps.—*  
[Sealed 13th December, 1830.]

THIS improvement consists in causing the necessary supply of oil required to feed the cotton or wick of a lamp with an Argand burner, to rise and to be kept up to the wick by the pressure of a column of water or other suitable transparent fluid, the specific gravity of which is heavier than oil, the water or other fluid being made to descend from an elevated transparent reservoir, the transparency of which, and of the fluid, prevents any shade being cast from the lamp.

In Plate VII, fig. 6, represents a sectional elevation of a table lamp upon the improved principle; *a*, is the ordinary Argand burner; *b, b*, the glass, and *c*, the chimney; *d, d*, is a brass cylinder enclosing the burner, which is furnished with the socket rim *e, e*. Into this socket is cemented the glass cup or reservoir *f, f*, which reservoir is supposed in the present instance to contain water. This water, flowing down the tube *g*, finds its way into the hollow pedestals of the lamp *h*, and supports upon its surface a column of oil *i, j, k*, which branches off at *k*, into the burner.

The oil is put into the lamp by means of a funnel, which is screwed or otherwise placed on the top of the burner. This funnel is represented detached at fig. 7 : *l*, is the cylindrical plug for putting on the cottons, which is provided with a screw at one end fitting into a female screw cut in the top of the burner, as shown at fig. 8, which represents the top of the burner.

The receiver *m*, is to catch the overflowing oil, and *n*, is a cock for drawing off the water and oil, if necessary at any time to empty the lamp. And here it may be necessary to observe, that the glass cup or reservoir should be ground at the outside so as to distribute the light more evenly.

It is evident by this arrangement of the oil and water channels, that as fast as the oil is consumed a fresh supply will be raised to the wick or cotton by the pressure of the column of water from the reservoir, while the transparency of the reservoir, and of the fluid it contains, will prevent any shadow being cast from either.

The Patentee says, in conclusion, I claim as my invention the raising of the oil to the wick or cotton by the pressure of a column of transparent fluid flowing from a transparent reservoir.—[*Inrolled in the Inrolment Office, June, 1831.*]

Specification drawn by Mr. Rotch.

## ORIGINAL COMMUNICATION.

## ON THE PROPOSED INVENTION-PATENT-BILLS.

*To the Right Hon. Lord Brougham and Vaux, Lord High Chancellor, &c.*

MY LORD,

HAVING been amongst the earliest who have pressed upon the attention of Government and of the public the very deficient state of the law for the protection of patented inventions; and having with considerable assiduity pointed out in detail the oppressions, absurdities, and evils of the present system in a series of letters inserted in this Journal, I humbly trust to your Lordship's indulgence for the liberty of addressing a few observations more particularly to your Lordship's immediate attention.

By means of your Lordship's judicious interference, the well-intended but inadequate and discrepant bill sent up from the Commons last session was postponed in the Upper House to this session. The public anxiously look to the redemption of your Lordship's pledge then given; and to the introduction of an efficient bill that shall embrace all those parts of the subject left untouched by the other House of Parliament." Your Lordship truly observed, that there is not a more DELICATE or difficult question of law than that of patents," and rather sarcastically added, that you supposed "that it was upon the Report of the Committee of Enquiry of the Commons that the Bill before their Lordships was founded."

Now, my Lord, the truth is, that the report of the Evidence taken before the Committee of Enquiry in 1830 discloses so many DELICATE matters, such varied modes of plundering inventors through means of the various antiquated and useless formalities connected with the issue of patents under the seals, such jobbing in the sale of the

royal sign-manual\*, "to the upsetting of men's rights," and such a mass of conflicting opinions upon the means of redress, that the Committee of Enquiry became either abashed or tired of their office; and, after heading the publication of the evidence taken before them with a short remark, that they had not time to *report upon the evidence* as the House had ordered, "they earnestly begged to be re-appointed *early* the next session, for the purpose of pursuing this delicate and important enquiry."

In the mean time their flaming zeal cooled down to zero. Session after session elapsed without any motion for a re-appointment of the Committee; their able chairman, who has been in every succeeding session, could never be induced to follow up the important enquiry with *a report upon the evidence*. So, my Lord, Parliament, the public, and your Lordship, may look into the evidence as Orpheus did into the infernal regions, and draw your several conclusions as to what you see there.

Possibly by this time your Lordship has had an opportunity of going carefully into the report of the evidence upon this subject; if so, the result, no doubt, will be a determination to relieve inventors from at least a part of the useless formalities and extravagant charges attending the issue of patents under the Great and little Seals.

I more particularly request, on behalf of injured inventors, your Lordship's attention to the abolition of the fees in cases where no duties are performed, or to be performed, under the new act; because the second or amended Bill, as proposed by the Committee to complete the new system, in page 3. line 8 to 15, dispenses with the sign-manual of His Majesty as unnecessary, and enacts "that the Lord Chancellor may affix the Great Seal to letters patent for inventions upon the authority of the Report and

\* See Mr. Rotch's evidence.

**Bill of His Majesty's Attorney or Solicitor-general, without positively enacting the abolition of the fees attendant upon the usual routine of affixing the Privy Seal and Signet to the warrants.**

By a reference to the evidence, your Lordship will find that several fees connected with the Great Seal here, and especially with that of Ireland, are paid without *any* duties performed. In regard of patents for inventions, those fees should be abolished altogether; they operate to the public prejudice in restricting the free exercise of inventive talent; and, in these cases, vested interests, if there be any in the existing holders of these sinecure offices, should be provided for by Parliament.

I may be here allowed an observation upon the stamp duties taken by Government upon patents for inventions. The annual average received upon all such patents for Great Britain and Ireland is about 8,000*l.*; a sum not worth consideration to the Exchequer, but acting upon inventors as a galling burden. These duties, together with the fees of the patents, exclude thousands of inventions from a fair public trial, to the great prejudice of poor inventors especially, who are thereby unjustly forced to disclose their discoveries under every disadvantage, or to forego their probable benefit altogether.

An invention, my Lord, is a matter of inherent right in the party inventing, antecedent to any claim the public can have respecting it; its merits or value to the public cannot be ascertained *à priori*, but must be the result of actual trial. To exclude any man by high duties and fees from freely making that trial, is arbitrarily and unjustly to divest him of his rights; it is to place the rich man in a better situation in respect of the protection to his property than is allowed to the poor man—in fine, to tax talent before it becomes productive, or, indeed, tangible, *as a*

**property, to its owner—is a course equally detrimental to the public interests, as it is oppressive and incalculably unjust to the individual.**

My Lord, I humbly trust these few observations may have some weight when the Bill comes under the cognisance of Parliament; and confiding in your Lordship's public character for consistency, I anticipate an equal dealing with the antiquated pretensions and obsolete duties of patent seals and their offices as with the late rotten ~~be~~roughs,—the public welfare requires equally in *this case* a sweeping reform.

I will only add, that if, through your Lordship's interference, Government could be induced to relinquish the stamp duties, the increased employment of thousands of artisans, upon efficiently protected inventions, would amply replace to the Treasury, by the additional consumption of the highly-taxed necessities of life, the trivial loss of 8,000*l.* stamp duties upon invention patents.

I am, my Lord,  
Your Lordship's most obedient servant,  
VINDICATOR.

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### S U G A R   R E F I N I N G.

*(Continued from p. 101.)*

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#### Experiments made in the Government Sugar House, by Dr. Ure.

The sugar-house which I had hired had never been completely fitted up for the purpose, and was partially dismantled. There was no ware-room for the refined sugar; the wooden spar work of the stove was removed, and had to be replaced; the filter had to be procured and mounted, with its subsidiary pumps and cisterns; the mould water-cistern had to be made and sunk into the floor; the chimney, being cracked, required to be iron-

strapped, and secured to the wall of the building ; the yard had to be enclosed anew for security sake ; and a large water-cistern had to be provided. Lodgings had to be fitted up in the premises, for a couple of the workmen to guard the property during night, and to serve for the occasional accommodation of the master boiler, and of the umpires nominated by the West India body and by the refiners to superintend the conduct of the experiments. Much time was spent by the workmen in making these alterations, and other repairs, as well as in building up the safety boiling-pan. This apparatus, on which the success of the experiments depended in no very small degree, had been constructed by a coppersmith in town, in consequence of suggestions originally derived from me, though it had not been made under my superintendence, and did not entirely correspond to my views ; yet finding it nearly ready for action, and being urged to proceed without a moment's delay, I ventured to avail myself of its use.

About 15 tons of Brazil sugar, at 19*s.* 6*d.* per cwt., having been purchased by Messrs. Kemble, sugar brokers, of Mincing-lane, by desire of the Right Honourable the Board of Trade, for these experiments, I commenced operations on the 20th January 1832, by melting and clearing 33 cwt. 1 qr. 10 lbs. of sugar with the proportions of water, blood, and bone black, above stated. This sugar appeared to be of very indifferent quality for sugar-refining. Its price was 3*s.* per cwt. under the Gazette average price of British Colonial Sugar, when there was a short supply of Brazil sugars in the market. In some chests the sugar exhaled an offensive sour smell ; and in almost all it betrayed a small soft grain. Several skilful sugar refiners whom I consulted on the subject, assured me that they had nearly ruined their establishments by attempting to refine Brazil sugars alone of better quality, for the uncrystallisable syrup or smear had so accumulated upon them in the course of a season, as entirely to derange the routine of their operations, and to subject them to a heavy pecuniary loss. It was therefore with no little solicitude that I entered on the apparently unpromising task of extracting

in standard loaves and bastards, a maximum quantity from that parcel of Brazils. Nor could I expect any assistance from my personal friends among the sugar refiners, who regarded my intrusion into their business on this occasion as inquisitorial and impertinent. That solicitude was soon aggravated by two causes : 1st, The head boiler whom I had engaged to conduct the details of the sugar-house, became not a little perplexed with the apparatus and routine which I felt it my duty to adopt in accordance with the modern improvements in sugar refineries, and particularly the celebrated apparatus of the Honourable Mr. Howard, now so extensively introduced into them. 2d, It was found on trial that the bath-pan, with a temperature of 300° F., while it protected the sugar effectually from burning, did not effect so rapid a concentration of the syrup as was desirable ; a defect chiefly owing to the depth of the liquid mass between the iron case and the bottom of the copper pan. This evil was, however, soon lessened by lowering the copper pan in its case, and eventually removed by corrugating the copper bottom, so as to double the extent of heated surface applied to the same area of syrup. Thus, without increasing the intensity of the heat of the bath to a pitch injurious to saccharine matter, I could augment its evaporating energy in any wished-for degree. I readily acknowledge, however, that the damage done by slow evaporation and unlucky proofs during the two or three first weeks of our operations, entailed some injury on the whole of the first series of experiments. The proof by the touch having been on several occasions taken too low ; that is, the syrup having been judged, from the moderation of its temperature, sufficiently inspissated, while it was in reality too thin, and having been also filled out into the moulds in too cold a state, from our want of a steam-cased heater, the resulting loaves were not only porous, but so devoid of cohesion, that, falling into powder when taken out of the moulds, they had to be worked up again with the syrups and drips. The journal of the work, or details of the proceedings, are given in Table I. p. 16; at the end of the Report, as regularly noted down by Mr.

Morgan, the officer of the Customs placed in charge of the sugars.

The following is a general abstract of the results of the first experiment :—

TABLE I.

The Results of Experiment on Clayed Brazils, a' 19s. 6d.

per cwt. <sup>24s.</sup> ~~24s. 6d.~~

	Cwts. qrs. lbs.	Duty.
Sugar melted and boiled	152 1 13	a' 24s. - 182 <i>l.</i> 16 <i>s.</i> 9 <i>d.</i>
Total extract in loaves, bastards and treacle	142 1 16	
Waste or Loss	9 3 25	Loss per cwt. 7.33 lbs.

The sugar was excessively foul; but a part of this great loss was clearly owing to the absorption of saccharine matter by the new moulds and pots; one cwt. is supposed to have disappeared in this way. The first experiment in a new sugar-house, therefore, must always be unproductive.

	Cwt. qrs. lbs.	Drawback	£	s.	d.
Extract in Double loaves	19 3 1 - a' 54s. p' cwt.	53 7 0			
— Single loaves	68 2 24 - a' 46s.	158 0 9			
— Bastards	23 1 25 - a' 30s.	35 4 2			
— Treacle	30 1 22		246	11	11
	142 1 16	Deduct 1-5th = 49 6 4 <i>½</i>			
		Actual Drawback - 197 5 6 <i>½</i>			
		Duty paid - 182 16 9			
		Loss to Revenue £14 8 9 <i>½</i>			

Cwt. qrs. lbs.	Cwt. qrs. lbs.
19 3 1 Double loaves, equivalent to	23 0 24 Single loaves.
Weighed out - - - 68 2 24	— —

Total Extract estimated in single loaves 91 3 20

Cwt. qrs. lbs.	Cwt. qrs. lbs.	Cwt. qrs. lbs.	lbs.
152 1 13 : 91 3 20 :: 112 : 67.57	= Extract in single loaves p' cwt.		
152 1 13 : 23 1 25 :: 112 : 17.25	= The bastards per cwt.		
115 1 13 : 30 1 22 :: 112 : 22.40	= The molasses per cwt.		

From the singularly indifferent quality of the sugar, and other circumstances of this experiment, I do not consider the results

as entitled to represent the average extract of clayed Brazil sugars. An import duty of 26s. per cwt. would be equivalent to the above calculated drawback.

*Second Series of Experiments.*

The causes which concurred to affect, in some measure, the precision of the first series of experiments, operated very slightly on the second, performed on a mixture of a portion of the same Brazils with an equal weight of British Colonial sugar. The introduction of crystalline, though very brown Jamaica sugars, served to communicate grain to the extract; the master boiler had become more skilful in taking the proofs; and the apparatus was much improved. This series commenced on April 2d, with the melting of a mixture of 16 cwt. 1 qr. 19 lbs. of Brazils, and 16 cwt. 2 qrs. 27 lbs. of Jamaica sugars. The journal of the experiments is given in Table II. p. 17. The sugar received the very same treatment in regard to clearing with bullock's blood and bone black as the preceding quantity did, and the syrup was evaporated by a muriate of lime bath in a similar way. The total quantity of sugar melted and boiled was 99 cwt. 0 qrs. 24 lbs. of Brazils, and 99 cwt. 2 qrs. 19 lbs. of British Colonial, amounting in all to 198 cwt. 3 qrs. 15 lbs. The loss or waste in this set of experiments was not so great as before, chiefly in consequence of the moulds having become generally saturated with sugar. A few new ones only were brought into action.

TABLE Iy.

Results of Experiment on a quantity of Clayed Brazils a' 19s. 6d. and Jamaica at 22s. 6d. per cwt.

	Cwt.	qrs.	lbs.	Duty.
Sugar melted and boiled	198	3	15	a' 24s. - 238l. 13s. 2d.
Total extract in loaves, bastards and treacle	187	1	9	
Waste or Loss	11	2	6	Loss per cwt. 6.5 lbs.

	Cwt. qrs. lbs.	Drawback.	£	s.	d.
Extract in Double loaves -	47 3 25	a' 54s. p' cwt.	129	5	6
— Single loaves -	72 1 2	a' 46s.	166	4	6
— Bastards -	29 0 17	a' 30s.	43	14	6
— Treacle -	37 3 21				
			339	4	5
Total Extract -	<u>187 1 9</u>	Deduct 1-5th -	67	16	10
		Actual Drawback -	271	7	7
		Duty paid -	238	13	2
		Loss to Revenue	<u>£32 14 5</u>		

An import duty of 27s. 3½d. per cwt. would be equivalent to the Drawback.

Cwt. qrs. lbs.	Cwt. qrs. lbs.
47 3 25 Double loaves, equivalent to -	56 1 7.4 Single loaves.
Single loaves weighed -	72 1 2
Total Extract estimated in single loaves -	<u>128 2 9.4</u>

Cwt. qrs. lbs. Cwt. qrs. lbs. lbs. lbs.  
 198 3 15 : 128 2 9½ :: 112 : 72.464 = Extract in single loaves per cwt.  
 198 3 15 : 29 — 17 :: 112 : 14.700 = The bastards per cwt.  
 198 3 15 : 37 3 21 :: 112 : 19.00 = The molasses per cwt.

### Third Series of Experiments.

This set was made on the residuary portion of the same parcel of Jamaica sugars which had entered into the materials of the second. The total quantity melted and refined was 199 cwt. 0 qrs. 14 lbs.; the operations commenced on June 13th, with 35 cwt. 1 qr. 11 lbs. The sugar was in general very dark coloured, replete with molasses, and would have taken much more than five per cent. of bone black for making the most profitable extract. For the sake of comparison, however, the bone black was limited to that proportion. The experiment was a straightforward one, of perfect regularity. The journal of the proceedings is given in Table III. p. 18. This and the subsequent experiments were conducted by the new head boiler, whom I had been forced by circumstances to hire hastily without much investigation. His experience was more varied than that of his predecessor, but his circumstances were less independent.

Such dark brown sugars are very commonly subjected to a preliminary cleansing operation before they are admitted into the

melting pan; an operation performed in one or other of the three following ways:—

1st, By making the sugar into a pap with hot water, putting the pap into moulds, cooling and draining it; when it receives the name of meltings, being freed from much of its molassy colour and ferment.

2d, By placing it in shallow iron chests with a false bottom of wire-cloth, sprinkling it with water, and subjecting it in this moistened state to atmospheric pressure, by creating a vacuum under it with an air pump.

3d, By subjecting the sugars previously moistened and enclosed in wooden bags to the action of a powerful hydraulic press, exerting a force of 500 or 600 tons. By these methods, the molassy ferment, so abundant and so active in empyreumatic brown sugars, being extracted, enables the refiner to boil the cleansed part with much less hazard of generating smear. Having neither a pneumatic nor hydraulic apparatus at my command, and little convenience for the operose method of meltings, I was under the necessity of putting the sugar directly into the clarifying pan, so that the extract was in this respect made under somewhat unfavourable circumstances. The process was otherwise unexceptionable; the evaporating pan doing its duty in a satisfactory way. The smallness of the waste, amounting to rather less than 5 lb. on 112 lb. of the raw material, affords good evidence of the care taken in the various operations.

TABLE III.

Result of Experiment on British Colonial Sugar, at 22s. 6d. per cwt.

	Cwt. qrs. lbs.	Duty.
Sugar melted and boiled	199 — 14	24s. 2d. 238l. 19s.
Total extract in loaves, bastards and treacle	190 1 2	
Waste or Loss	8 3 2	Loss per cwt. 4.928 lbs.

	Cwt. qrs. lbs.	Drawback	£ s. d.
Extract in Double loaves	13 2 6	a' 54s. p' cwt.	36 11 10 $\frac{1}{2}$
— Single loaves	96 3 10	a' 46s.	222 14 7 $\frac{1}{2}$
— Bastards	38 2 12	a' 30s.	57 18 2
— Treacle	41 1 12		
	—————		£317 4 8 $\frac{1}{2}$
Total Extract	190 1 12	Deduct 1-5th	63 8 10 $\frac{1}{2}$
	—————		—————
		Total Drawback	253 15 6 $\frac{1}{2}$
		Duty paid	238 19 0

Loss to Revenue, per cwt., 1s. 5 $\frac{1}{2}$ d.      Loss to Revenue in all, £14 16 6 $\frac{1}{2}$

Cwt. qrs. lbs.	Cwt. qrs. lbs.
13 2 6 Double loaves are equivalent to	15 3 17 Single loaves.
Single loaves weighed	96 3 10
Total Extract estimated in single loaves	112 2 27

Cwt. qrs. lbs.      Cwt. qrs. lbs.      lbs.      lbs.  
 199 — 14 : 112 2 27 :: 112 : 63.41 = Extract in single loaves per cwt.  
 199 — 14 : 38 2 12 :: 112 : 21.70 = The bastards per cwt.  
 199 — 14 : 41 1 12 :: 112 : 23.26 = The molasses per cwt.

(To be continued.)

**COURT OF EXCHEQUER, WESTMINSTER, FEB. 14.**

(Before Lord Lyndhurst and a Special Jury.)

RUSSELL *v.* COWLEY AND ANOTHER.

THIS was an issue out of Chancery, to try whether the defendants, iron-manufacturers at Walsall, had infringed upon a patent granted to Cornelius Whitehouse, of Wednesbury, "for his invention of certain improvements in manufacturing tubes for gas, and other purposes,"\* and assigned by Whitehouse to the plaintiff.

Sir James Scarlett, Mr. Rotch, and Mr. Follett, were for the plaintiff; and the Solicitor-General, Mr. Platt, and Mr. Richards, were for the defendant.

Sir Jas. Scarlett described the invention as one of the greatest importance, and making almost a revolution in the manufacture of iron tubes. The improvement consisted in passing the iron of which the tubes were to be made through swages, or other such instruments, which was done by preparing a piece of flat iron for welding, by being bent up on the sides, the edges nearly meeting, so as to make the piece in form of a cylindrical tube, which is put

\* For the Specification of this Patent, see London Journal of Arts, vol. x., page 254. Specification drawn by Mr. Newton.

into a hollow fire, heated by a blast, and when the iron is on the point of fusion it is drawn out of the furnace by means of a chain attached to a draw-bench, and passed through a pair of dies of the size required, which welds the edges of the iron together. One of the plaintiff's workmen quitted his service and entered that of the defendants, who shortly afterwards made an instrument copied from the plaintiff's, with the addition only of certain rollers, which were of no use. This was the infraction complained of.

Several witnesses, amongst whom was Mr. Brunel and Mr. Donkin, were examined, and the plaintiff's case having occupied the whole of the day, his Lordship adjourned the cause until the following day.

*The Solicitor-General*, for the defendants, addressed the jury, and contended, first, that the plaintiff's patent had not been infringed at all, and secondly, that the plaintiff's patent itself was not good. In 1811 a patent was granted to Messrs James and Jones, by which gun barrels were welded between a pair of rollers, grooved to fit the form of the barrel, the rollers having either alternate or rotatory motion, and being worked by steam or other mechanical powers. That patent was expired, and the defendants confined their welding to rollers, which was no infringement of the plaintiff's patent for welding by dies, pincers, or holes.

In 1808 a patent was granted to Benjamin Cook for an improvement in the manufacture of gun barrels, in which he states his method was to take plates of iron, made to the proper size, form, and thickness, which he turned over a mandrel beak iron and welded them. The plaintiff claimed the whole invention of welding a pipe by drawing it through a die, but the defendants' mode was by rollers, which differed entirely from the die. They had a workman of the name of Royl, who several years after he left the plaintiff entered into the defendants' service, and it was his intention to call Royl before the jury, to state what their mode was. The plaintiff had not called Whitehouse, the inventor, who might have told the jury in what manner the invention had come into his head, because his friend knew if he had been called that the patent would have fallen, as Whitehouse on his cross-examination would have been proved to have been guilty of a piracy. The advantage of having the action brought by the assignee of a patent was, that the original inventor might be called to explain his invention, and to show that it was an original discovery, an important advantage where it was a real discovery, and the jury would judge why this had not been done. Scientific men had, by order of the Court of Chancery, examined the respective machinery of the parties, and Messrs. Donkin and Brunel, the examiners for the plaintiff, had given their evidence; but, however experienced and eminent they were in very many branches of mechanics, they had never seen an iron tube manufactured until this examination in July last. The defendants' tubes passed through the rollers, and

by that means a pressure of 5,000lb. weight was obtained, which effected the welding; but the plaintiff said this welding was improved by the scorpion; that however could not be, because the welding when once done was completed, and was not susceptible of further improvement. If the defendants had used the rollers without the mandrel, that would have been an infringement of Jones and James's patent. The plaintiff claimed in Whitehouse's patent the whole invention of welding by pressure given by drawing through a hole; he had therefore claimed more than he was entitled to, and the patent was not good.

*Sir Jas. Scarlett.*—The evidence states that the rollers do not effect any but one object, and that is the welding.

*The Solicitor-General.*—You claim this patent for the elongation. The machinery for effecting the object was as good before the plaintiff's invention as subsequently.

*Lord Lyndhurst.*—Will you allow me to say that I think the best course to pursue now that you have gone so far with the case is to go on with it, and leave this to be made a point of. I shall reserve it for the Solicitor-General.

*Solicitor-General.*—Then, my Lord, I cannot wish to argue the case any further. I will, however, put in Cook's patent.

[The copy of the Specification of the patents of Jones, and James, and Cook, were then put in.]

*Lord Lyndhurst.*—The present patent is not for lengthening, but it is a patent for welding in a particular manner by which lengthening is produced as an incident.

*Solicitor-General.*—Yes, my Lord, and in Cook's patent there is the exact scorpion.

*Lord Lyndhurst.*—So there may be.

*Solicitor-General.*—Yes, my Lord, and for the purpose of elongation.

*Lord Lyndhurst.*—And for the purpose of welding?

*Solicitor-General.*—Yes, my Lord, for welding also.

*Lord Lyndhurst.*—But the present patent is for a particular mode of welding, but not for lengthening, except as an incident, and it does not interfere with that at all, according to my apprehension.

*Solicitor-General.*—That is the view I take of it; but it is to meet the arguments on the other side that I put this in.

*Lord Lyndhurst.*—Well, put it in; I think there is nothing in the objection, therefore this you put in as part of your evidence.

Cook's Specification was then read. On arriving at the part which runs thus,—

“ My second method is to take plates or scalps of iron or steel drawn under the hammer, or rolled, or otherwise made to the proper size, form, and thickness, which I turn over a mandrel beak iron, or any thing suitable for the purpose, and weld them; I then draw or force them through holes, or plates with graduated holes, as above; or I pass them between rollers with grooves in them, as

before specified, until they have attained the length, size, form, and thickness desired."

*Lord Lyndhurst.*—In your Specification the plaintiff very cautiously uses the word "pass." He does not make use of the word "draw," but whether it is "passed" or "drawn," if it is "passed" through the holes, it would be the same as being "drawn," you know.

*Sir Jas. Scarlett.*—It would be a most unfortunate thing if a patent which has produced such beneficial effects were to be upset now.

*Lord Lyndhurst.*—I know that, and that is the reason why I am pursuing the course I now am.

*Sir Jas. Scarlett.*—We considered the subject, and it has been contended from first to last that the rollers were an imitation of ours.

*Lord Lyndhurst.*—Did you, Mr. Solicitor-General, hear what Mr. Brunel and Mr. Donkin said in answer to the question I put to them?

*Solicitor-General.*—Yes, my Lord, I did, but we have not had an opportunity of discussing that.

*Lord Lyndhurst.*—Well, the course I am pursuing is the right course. It is to go on with the case. I leave Mr. Solicitor-General to make the objection afterwards.

*Solicitor-General.*—My Lord, I feel so much confidence on this, that *meo periculo* I give no further evidence.

*Lord Lyndhurst.*—Very well, then; a verdict for the plaintiff, with liberty to you to move.

*Solicitor-General.*—Your Lordship gives no opinion against us?

*Lord Lyndhurst.*—Oh, not at all: you rely upon this, and offer no evidence.

*Solicitor-General.*—Exactly so, my Lord.

*Lord Lyndhurst.*—And you, the plaintiff, have a verdict for the nominal damages, with liberty to the defendant to move.

*Solicitor-General.*—If your Lordship pleases.



### List of Patents

Granted by the French Government from the 1st of July to the 30th of September, 1834.

#### PATENTS FOR FIFTEEN YEARS.

To Mr. Tournet, carpenter, represented by Mr. Perpigna, of the French and Foreign Office for Patents, Rue Choiseul, No. 4, for an improved system of scaffolding applicable to the repairing of houses, public buildings, &c.

— Bailey, William, of Douay, for an improved bobbin net frame for manufacturing bands of net with edging.

To Daubree, Edward, of Laraur, for a new application of threads of caoutchouc in the manufacturing of elastic tissues.

— Holcroft, George, engineer, of Rothau, for an improved method of manufacturing twisted barrels for fire-arms.

— Barker, Arthur, of Paris, for an improved system of rails, called New York patent guard rail.

— Thiboumery, chemist, for a method of manufacturing sulphate of quinine without alcohol.

— Boucher, Louis Joseph, for a method of manufacturing hand-kerchiefs wholly of silk, and in imitation of the India hand-kerchiefs.

— Tacot, Auguste, watchmaker, for a new application of the centrifugal force to clocks and watches.

— Bouyon, Barthelemy, for an hydraulic machine with centrifugal force.

— Klin and Cappy, of Strasbourg, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, for an economical system of making shoes and boots.

## PATENTS FOR TEN YEARS.

— De Coninck, of Copenhagen, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, 4, Rue Choiseul, for an instrument called by him Clinometer, and calculated to indicate the trim of ships at sea.

— Rotch, Benjamin, of London, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, 4, Rue Choiseul, for a metallic alloy to be employed in the sheathing of ships, and for making bolts and other the like ships' fastenings.

— Moisson, Isidore, engineer, of Rouen, for a mechanical apparatus driven by the action of wind or water.

— Ricard and Gachet, of Lyons, for improvements in the Jacquart frame.

— Thomas, Jean Baptiste, of Gironne, for a machine for stamping metals into various shapes.

To Collier, James, of Paris, for an improved method of manufacturing hydrogen gas.

— Mahiet, Charles, for a new motive power to be employed in lieu of steam.

— Parker, Samuel, of London, for an apparatus to deprive certain substances of smell, taste, or colour.

— Teanina, Louis Francois, for an economical stove for culinary purposes.

— Ménage, Thomas Martin, for a new kind of mechanical lamp.

— Leavers, John, of Grand-Couronne, near Rouen, for improvements on that kind of frame for bobbin net known under the name of Leavers' system.

— Rouveirollis, Jean, for a method of measuring the strength of spirits.

— Charles and Mutel, of Bordeaux, for a new kind of dragging boat.

— Plendoux, Jean Honoré, of Marseilles, for an improved kneading machine.

— Cordier, Lalande, of Paris, for an improved lamp.

— Lemare, Pierre Alexandre, of Paris, for an apparatus called by him Pantothermes.

— Soulas, Achille Elie Joseph, for improvements in the self-acting mules, and applicable to all machines used for spinning or preparing cotton, wool, or flax.

— The Marquis de la Fesullade, Viscount d'Aubusson, for a machine driven by condensed air, through the pressure of water, quicksilver, or any other fluid.

## PATENTS FOR FIVE YEARS.

— Pitriot, Gariot and Co., of Lyons, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, 4, Rue Choiseul, for an improved loom for weaving plush.

— Greiling, of Paris, for portable urinals.

— Honoré and Grovelle, for an improved method of drying by mechanical pressure the earth employed in making pottery

To Machizot and Molozay, engineers, Lyons, for machines called by them *Cametieres rondes et longues*, and used in winding silk.

- Berlet, Noel, of Remes, for a machine for doubling and twisting wool.
- Saute, Dominique, of Dieuze, for an economical fire-grate.
- Johnsen, Jean Baptiste Joseph, of Paris, for his method of manufacturing a syrup with paragus' tops.
- Dupuis, Jean Marie, of Paris, for a new method of drawing from bust.
- Ventouillar and Larnorbé, of Laraur, for a machine consisting in a stove, a boiler, a pan, and lathe, and to be used in winding off the silk from the cod.
- Svatty, Balthazar, of Paris, for improved trusses made in one piece, with several springs, and either a fixed or moveable pad.
- Josselin, Pousse and Co., of Paris, for a cylindrical buckle.
- Mayette, Jean, of Tushima, for a three-wheeled waggon.
- Payan and Charmer, for an expeditious method of manufacturing bricks.
- Lelong, Alexis Antoine, for an improved galon made of wool, silk, &c.
- Bæringuer, Baumgarten, of Mulhouse, for a machine for measuring and folding cloths of all kind.
- Alphouse, Giroux and Co., of Paris, for an optical instrument called Phenakistoscope.
- Meunier, Michel George, of Blois, for a machine for pulverising plaster of Paris.
- Fozembas, Antoine, of Bordeaux, for a physical instrument called Electro-moteur.
- Guyon, Augustin, of Dijon, for a machine for bruising and preparing fl. x.
- Ordronaux, of New York, for a new filter for clarifying liquors, and especially syrups.
- Meideck, Paulinus, of Paris, for a new mechanism applicable to the escapement in pianos.

To Murat, Jacques, of St. Etienne, for a method of giving a uniform and regulating motion to the Jacquart frame.

— Bourlet d'Amborse, of Paris, for a new kind of nutritic substance, called by him Allahtaim.

— Daclin, Claude Jean, for a process of manufacturing ribbons by the agency of a batten provided with hooks.

— Chaumounot, Charles Albert, of Paris, for a new process of purifying and softening Armenian bole.

— Andrieu, Theophile Francois, for an apparatus to work under water.

— Guelle, Jean, plumber, of Paris, for an improved water closet.

— Pelissard, Paulin, of Gimont, for an instrument to carry off the earth produced by excavations.

— Varlet, Francois Joseph, of Thionville, for a new method of making various culinary and other implements with tinned sheet iron.

— Didelon, Sebastien, for a thrashing machine.

— Boutté, Pierre Joseph, of Paris, for improvements in locks.

— Progind, Francois Xavier, of Marseilles, for an instrument called a Typographic pen.

— Lebourallet, Antoine, of Paris, for a cylindrical dial revolving on the surface of any liquid.

— Davenne, Louis Dominique, for a new kind of umbrella called by him Davenn-abri.

— Messier and Amaret, perfumers, of Paris, for a cream to soften the beard, and render more easy the use of the razor.

— Wattine, Dervaux, Arrecks, Jacquart, and Jacquart, brothers, of Turcoing, for a machine for spinning carded wool in the highest numbers.

— Phillippe, Jacques Louis, of St. Quentin, for a method of depriving the indigo of its oxygen.

— Caron, Adrien Francois, of St. Valery, for a lock on an improved principle.

— Villeroi, Brutus Amedée, for a new kind of printing-press called by him Typolithographic.

— Virey, Isaac, brass-founder, for a new kind of compass.

To Benel, Jean, of Bordeaux, for improvements in the manner of manufacturing gas for illumination.

— Dumas, Pierre Louis, engineer, of Paris, for an improved fire-grate.

— Delacour, Francois Tules, of Paris, for a new kind of leather-preserving blacking.

— Champonnois and d'Aburille, of Jouchery, for an apparatus for concentrating syrups and other liquids.

— Magny, Francois, for a process which enables the diver to remain under water for a considerable time.

— Boumot, Jean Baptiste, for a pump operating both on the suction and forcing principle without piston; or with a fixed piston.

— Chevalier, Louis Victor, for an improved method of constructing barometers so as to render them portable.

— Andell, Alexandre Newton Francois, for an apparatus for preparing the warp threads used in hand or power looms.

PATENTS FOR IMPROVEMENTS AND ADDITIONS MADE ON THEIR ORIGINAL SPECIFICATIONS BY THE PATENTEES THEMSELVES.

— Brame, Chevalier, of Lille, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, 4, Rue Choiseul, for improvements on his system of evaporation and distillation.

— Guerin, Guillaume Antoine, boot-maker, of Paris, represented by Mr. Perpigna, of the French and Foreign Office for Patents, 4, Rue Choiseul, for an improved kind of clog.

— Laporte, Jean Baptiste, of Paris, for a machine called by him Hainselline, or motive power.

— Auffroy, Jacques Francois, of Paris, for phials and bottles manufactured with waterproof hemp thread lined with tin.

— Pope, Henri, of Paris, for a new kind of sounding board for pianos.

— Herisson and Garnier, of Paris, for an instrument called Pulsomètre.

— Huard and Fouju, of Paris, for a new method of extracting the juice of beet-root without using the press.

To Perröt, Louis Jerome, engineer, of Rouen, for several methods of printing on tissues.

— Roland de Blomac, of Carcassonne, for a means of increasing tenfold the value of the lees in the process of making wine from the grape.

— Guidicelli, Joseph Marie, professor of mathematics, for a mechanical apparatus called *moderato-moteur*.

— Gille, Jean Marie, of Paris, for a new way of conveying heat to apartments and houses.

— Courtois, Jacques Antoine, of Paris, for a new kind of tile with curved rim, so as to fit one on another.

— Bocrary, Jean Baptiste Marie, for a new method of absorbing and neutralising the infectious smell of matters extracted from privies, and for producing thereby a new kind of manure.

— Burat, brothers, truss-makers, 12, Rue Mandar, for new trusses with fixed pads and moveable and articulating springs.

— Guibout and Sanson, for an improved method of cleansing privy-vaults by the means of air-tight vessels.

— Joseph and Co., of Paris, for a new kind of fire bottle.

— Dupré, André George, for a metallic stopper, to be used instead of corks and rosin for stopping spirituous wines, gaseous waters, &c.

— Daubanton, for an improved method of manufacturing paper with straw.

— Labausse, Francois Joseph, of Paris, for an instrument to cut crayons.

— Chatel, Maurice, of Rouen, for a new motive power to act as a substitute for steam and horse power in driving machinery.

— Pinet, Jean Isidore, for a new machine to be used in spinning.

— Fruictier, Pierre Charles Marie, of Sery, for a new system of throwing and twisting, applicable to mules.

— Delestrode, Maxime, paper manufacturer, at Marseilles, for a new method of manufacturing paper.

— Sirheury, Charles Louis, of Paris, for an improved lithotritor.

— Pape, Jean Henri, piano manufacturer, for a fourth improvement on his newly-invented sounding board for pianos.

To Clement Désormes, Nicholas, of Paris, for a second improvement on his method of substituting wood to charcoal in furnaces for preparing metals.

— Moineau, Auguste, of Paris, for improvements on his flyer with perpetual motion.

— Moisson, Isidore Alphonse, of Rouen, for an apparatus driven by the sole action of air or water, and capable of propelling ships, mills, and the like.

— Lucas, Jean Marie, of Rennes, for improvements on his system of machinery to be used in making pottery, bricks, tiles, &c.

— Le Bel, Pierre, of Nantes, for improvements on his method of spinning flax with a flying spindle.

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*New Patents*

## S E A L E D I N E N G L A N D,

1834.

To John Ramsey, of Caroline-place, Mecklenburgh-square, in the county of Middlesex, Esq., for his invention of certain improvements in apparatus for turning over the leaves of music and other books.—Sealed 26th February—6 months for enrolment of specification.

To Vincent Nolte, of Bridge-street, Blackfriars, in the city of London, Esq., for an improved hydraulic power engine.—Sealed 27th February—6 months for enrolment.

To James Smith, of Deanston Works, in the parish of Kilmadoch, in the county of Perth, cotton spinner, for his invention of certain improvements in machinery for carding cotton, flax, wool, silk, and other fibrous materials.—Sealed 27th February—6 months for enrolment.

To James Duffield Harding, of Gordon-square, in the county of Middlesex, artist, for his invention of certain

improvements on pencil, pen, and chalk cases or holders.—Sealed 27th February—6 months for enrolment.

To Joseph Whitworth, of Manchester, in the county palatine of Lancaster, machinist, for his invention of certain improvements in machinery or apparatus for cutting screws.—Sealed 27th February—6 months for enrolment.

To Robert Hendrick Goddard, of Woolwich, in the county of Kent, gentleman, for his invention of certain improvements in the construction of weighing machines, and in the mode, manner, or method of ascertaining, registering, and indicating the number of operations or quantity of work performed by weighing, measuring, or numbering apparatus or machines.—Sealed 27th February—6 months for enrolment.

To Thomas John Fuller, of the Commercial-road, in the county of Middlesex, civil engineer, for his invention of an improvement or improvements in machinery or apparatus for making or manufacturing of nails.—Sealed 27th February—6 months for enrolment.

To William Augustus Archbald, a lieutenant in his Majesty's navy, at present residing at the Tavistock Hotel, Covent-garden, in the county of Middlesex, for his invention of a certain improvement in the making of sugars.—Sealed 27th February—6 months for enrolment.

To Henry Pinkus, late of Pennsylvania, in the United States of America, now of North-crescent, Bedford-square, gentleman, for his invention of an improved method of, or apparatus for, communicating and transmitting or extending motive power, by means whereof carriages or waggons may be propelled on railways or common roads, and ves-

seis may be propelled on canals.—Sealed 1st March—6 months for inrolment.

To Thomas John Fuller, of the Commercial-road, in the county of Middlesex, civil engineer, for his invention of an improvement in the shape or form of nails, spikes, and bolts.—Sealed 6th March—6 months for inrolment.

To William Morgan, of the Kent-road, in the county of Surrey, Esq., for his invention of improvements in certain kinds of steam engines.—Sealed 13th March—6 months for inrolment.

To John Augustus Manton, late of Calcutta, in the East Indies, but now residing with his brother at the Small Gun-office in the Tower of London, gun-maker, for his invention of certain improvements in fire-arms.—Sealed 13th March—6 months for inrolment.

To John Isaac Hawkins, of Pancras Vale, in the county of Middlesex, civil engineer, for certain improved instruments for facilitating the cure of disease by administering galvanic influence into the human body, being a communication from a foreigner residing abroad.—Sealed 13th March—6 months for inrolment.

To James Jamieson Cordes, of Idol-lane, in the city of London, merchant, for a certain improvement or improvements in machinery for making rivets and screw blanks or bolts, being a communication from a foreigner residing abroad.—Sealed 18th March—6 months for inrolment.

To James Jamieson Cordes, of Idol-lane, in the city of London, merchant, for a certain improvement or improvements in machinery for making nails, being a communica-

tion from a foreigner residing abroad.—Sealed 18th March—6 months for enrolment.

To Samuel Slocum, of the New-road, St. Paneras, in the county of Middlesex, engineer, for his invention of a certain improvement or improvements in machinery for making nails.—Sealed 18th March—6 months for enrolment.

To Samuel Slocum, of the New-road, St. Pancras, in the county of Middlesex, engineer, for improvements in machinery for making pins.—Sealed 18th March—6 months for enrolment.

To John Paterson Reid, of the city of Glasgow, merchant, and Thomas Johnson, of the same place, mechanic, for their invention of certain improvements applicable to certain looms for weaving different sorts of cloth.—Sealed 20th March—6 months for enrolment.

To Henry Crane, of Wolverhampton, in the county of Stafford, merchant, and John Young, of the same place, patent lock manufacturer, for their invention of certain improvements in the making or manufacturing and forming of iron for hoops of casks and other purposes.—Sealed 20th March—6 months for enrolment.

To Thomas Baker, of Upper Stamford-street, in the county of Surrey, gentleman, for certain improvements in the construction or mechanism of chronometers, watches, and clocks, and which may also be applicable to other mechanical purposes, being a communication from a foreigner residing abroad.—Sealed 20th March—6 months for enrolment.

## CELESTIAL PHENOMENA, FOR APRIL, 1834.

D.	H. M.	D.	H. M.
1	Clock before the ☽ 4 m. 1s. — ☽ passes the mer. 19h. 15m.	20	Clock after the ☽ 1 m. 6s. — ☽ passes the mer. 9h. 45m.
7 52	♀'s first sat. will emerge		Occul. ♀ Virginus im. 8h. 6m. em. 9h. 7m.
4 2 3	☿ in conj. with ☽ diff. of dec. 3. 34. N.	21	5 42 ♀ in conj. with the ☽ diff. of dec. 2. 35. S.
19 3	♂ in conj. with the ☽ diff. of dec. 3. 25. N.	22	☽ in perigee.
5	Clock before the ☽ 2 m. 49s. — ☽ passes the mer. 22h. 19m.	23	Mer. R. A. 0 h. 23 m. dec. 0. 9. S.
6	Mer. R. A. 0 h. 3 m. dec. 1. 20. N.	—	Ven. R. A. 2 h. 44 m. dec. 15. 29. N.
—	Ven. R. A. 1 h. 28 m. dec. 8. 17. N.	—	Mars R. A. 23 h. 14 m. dec. 6. 21. S.
—	Mars R. A. 22 h. 28 m. dec. 10. 59. S.	—	Vesta R. A. 0 h. 59 m. dec. 0. 47. N.
—	Vesta R. A. 0 h. 32 m. dec. 1. 59. S.	—	Juno R. A. 19 h. 50 m. dec. 7. 19. S.
—	Juno R. A. 19 h. 38 m. dec. 8. 41. S.	—	Pallas R. A. 8 h. 57 m. dec. 7. 15. N.
—	Pallas R. A. 8 h. 41 m. dec. 2. 55. N.	—	Ceres R. A. 9 h. 55 m. dec. 26. 44. N.
—	Ceres R. A. 9 h. 53 m. dec. 28. 10. N.	—	Jup. R. A. 2 h. 49 m. dec. 15. 21. N.
—	Jup. R. A. 2 h. 34 m. dec. 14. 12. N.	—	Sat. R. A. 19 h. 24 m. dec. 0. 13. N.
—	Sat. R. A. 12 h. 29 m. dec. 0. 12. S.	—	Georg. R. A. 21 h. 53 m. dec. 13. 33. S.
—	Georg. R. A. 21 h. 51 m. dec. 13. 44. S.	—	Occul. ♀ Virginus, im. 7 h. 10m. em. 8h. 8m.
20	☽ in apogee.	23	2 35 Ecliptic oppo. or ☽ full moon.
23 48	♀ in conj. with the ☽ diff. of dec. 6. 6. N.	23	4 8 ♀ in conj. with ♀ diff. of dec. 0. 32. N.
8 16 42	Ecliptic conj. or ☽ new moon.	24	Occul. ♀ Libra im. 7 h. 49m: em. 8h. 44m.
10	Clock before the ☽ 1m. 28s.		Occul. ♀ Libra im. 8h. 50m. em. 9h. 49m.
—	☽ passes the mer. 1 h. 3 m.	25	Clock after the ☽ 2m. 7s. ☽ passes the mer. 14h. 17m.
12 36	♀ in conj. with the ☽ diff. of dec. 3. 1. N.	2 24	♂ greatest Hel. Lat. S.
21 48	♀ stationary.	6 30	♂ greatest elong. 27. 6. W.
11 10	♂ in conj. with λ in Aquarii, diff. of dec. 1. 0. N.	—	☽ passes the mer. 92h. 20m.
—	♂ passes the mer. 22h. 41m.	—	☽ passes the mer. 0h. 47m.
—	♂ passes the mer. 0 h. 35m.	—	♂ passes the mer. 21h. 10m.
—	♂ passes the mer. 21 h. 24 m.	—	♀ passes the mer. 0h. 39m.
—	♀ passes the mer. 1 h. 21 m.	80	Clock after the ☽ 2m. 55s.
15	Clock before the ☽ 0m. 4s	—	☽ passes the mer. 18 h. 48 m.
—	☽ passes the mer. 5 h. 7 m.	4 31	☽ in ☐ or last quarter.
16 12 1	☽ in ☐ or first quarter		
19 8 31	♀ in aphelion.		

M E T E O R O L O G I C A L J O U R N A L,  
FOR FEBRUARY AND MARCH, 1834.

1834.	Thermo.		Barometer.		Rain in inches.	1834.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	Hig.	Low.			Hig.	Low	Hig.	Low.	
Feb.						March					
26	51	28	30,35	30,25		14	51	28	30,34	30,29	
27	53	30	30,09	30,06		15	52	31	30,43	30,39	
28	51	42	30,12	30,05		16	49	30	30,47	Staty.	
March						17	48	31	30,46	30,45	
1	53	44	30,19	30,14	,1	18	47	29	30,48	30,46	
2	53	42	30,29	30,25		19	47	24	30,48	30,43	
3	53	43	30,31	30,25		20	46	33	30,39	30,38	
4	52	42	30,10	29,97		21	47	24	30,35	30,24	
5	57	46	29,74	29,50		22	49	39	30,16	30,04	
6	50	42	29,61	29,47	,1	23	51	37	29,90	29,70	,075
7	54	36	30,25	30,06		24	49	39	29,73	29,68	
8	55	40	30,31	30,29	,025	25	44	31	29,85	29,79	,025
9	55	40	30,34	30,32							
10	56	41	30,40	30,37							
11	57	40	30,42	30,41							
12	53	31	30,42	30,35							
13	49	39	30,31	30,26	,025						

Edmonton.

CHARLES HENRY ADAMS.

Latitude 51° 37' 32" N.  
Longitude 8° 51' West of Greenwich.

THE  
**London**  
**JOURNAL OF ARTS AND SCIENCES,**  
AND  
**REPERTORY**  
OF  
**PATENT INVENTIONS.**

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*CONJOINED SERIES.*

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No. XXV.

**Recent Patents.**



*To WILLIAM NEWTON, of the Office for Patents, Chancery-lane, in the parish of St. Andrew, Holborn, in the county of Middlesex, civil engineer, for an improved apparatus for boiling, evaporating, and concentrating syrups for the production of sugar, and also of saline liquors, or for the crystallisation of salt, which apparatus may also be employed in the process of distillation, being a communication made to him by a foreigner residing abroad.—[Sealed 20th June, 1833]*

THIS improved apparatus for boiling, evaporating, and concentrating syrups and saline liquors, and which is also applicable to the process of distillation, consists in certain

novel arrangements of machinery or apparatus hereinafter described, by means of which the evaporation of aqueous parts of syrups, and saline or other liquids, may be effected in a more perfect and expeditious manner than has heretofore been done ; the principal novel features being the employment of better and more efficient modes of injecting streams of hot or cold air into the evaporating pans or boilers, or the liquid contained therein ; which liquid, by the same apparatus, may, if required, be heated to any degree of temperature by the application of steam.

The general features of these novel arrangements of apparatus, consist, firstly, in the adaptation of a blowing machine, air injecting pump, or bellows, worked by a steam engine, or other motive power, which blowing apparatus is employed to force air through tubes and other passages into the lower parts of the evaporating pans.

Secondly, in the adaptation of certain apparatus, by means of which the air may be heated through the agency of steam to any required degree of temperature before entering the evaporating pans or boilers.

Thirdly, in the peculiar construction and arrangement of the evaporating pans, boilers, alembic, or still, and the steam and air pipes, vessels, tubes, and appendages, connected therewith ; by means of which the liquids, syrups, or other materials intended to be operated upon, may be heated to the required temperature, and evaporated or concentrated as required.

It will be perceived by the following explanation of the apparatus, that by means of these novel arrangements the combined action of the steam and hot or cold air may be brought into operation upon the syrups or liquids simultaneously, and that a constant ebullition and evaporation can be kept up at any required degree of temperature ; and after the desired evaporation has taken place, the

syrups under operation can be further heated before passing to the moulds or forms.

The Patentee has shown in the accompanying drawings three distinct applications of these arrangements of apparatus, which will sufficiently explain the features of the improvement. The first is an apparatus for boiling or evaporating syrups or liquids in open pans or vessels, as represented in Plate VIII, at figs. 1 and 2.

Fig. 1, exhibits a longitudinal elevation of the general arrangement of the apparatus, the evaporating pan being shown in section. Fig. 2, is a plan or horizontal view of the same : *a*, is a steam boiler of sufficient capacity to generate steam for working the high-pressure engine *B*, employed to actuate the injecting air pump *C*, and also to supply steam to heat the receivers *D* and *E*, when the air is required to be heated ; or the eduction steam discharged from the engine may be used for that purpose, if it should then be found to be of sufficiently high temperature. These receivers or heating apparatus consist of close vessels, each containing a worm or coiled pipe, through which, from the pipe *b*, the air is forced by the engine and blowing apparatus ; the interior of the vessels being filled with steam passed from the boilers by the pipes *a*, *a*, or from the eduction valve of the engine ; or instead of this arrangement, the operation may be reversed, the steam being conducted by a worm of larger dimensions, and the air driven through the interior of the vessels.

After the air has taken up a considerable portion of heat from the steam in the first receiver *D*, it is to be conducted by the pipe *c*, to the second receiver *E*, where its temperature becomes increased ; and having attained the degree of heat required, the air is then forced through the pipe *F*, to the evaporating pans.

Instead of employing a coiled pipe for heating the air

in the receivers D and E, those receivers may be constructed as shown in the sectional figures 3 and 4, where the receiver or heating apparatus is represented as consisting of an outer or close vessel D, D, having a number of tubes or pipes d, d, d, placed perpendicularly, inserted into plates f, f, at top and bottom.

These tubes are open at both ends, the steam being admitted into the upper part of the vessel by the pipe a, and passing downwards through the tubes d, d, d, into the lower part, where the condensed water is collected, and may be drawn off by the cock.

Cold air is forced into this vessel from the blowing apparatus through the pipe b; and having circulated among the steam tubes in the interior of the vessel, the air becomes heated, and then proceeds through the small holes of a perforated plate g, g, into the chamber e, e, e, above, from whence it passes through the pipe F, and large branches G, G, (see figs. 1 and 2,) to the evaporating pans containing the syrup, as shown at H, H, in both figures.

There are several smaller branch pipes h, h, h, h, leading from each of the large branch pipes which have their openings into a chamber I, below a perforated plate i, i, in the lower part of the interior of each evaporating pan; and by means of these pipes h, the heated air is conducted into the chamber I.

The hot air thus introduced into the chamber I, at the bottom part of the evaporating pan, rises through the numerous small holes in the perforated plate i, i, and by that means becomes distributed regularly through the mass of the liquid or syrup in the pan H, the effect of which is greatly increased and promoted by the heat of the steam emitted from the boiler through the pipes k, k.

The force of impulsion given to the stream of air by the

action of the blowing apparatus, causes it to rise up through the liquid mass, and produce a considerable and constant ebullition, thereby producing, at a low degree of heat, a rapid evaporation of the aqueous parts of the materials under operation.

In order that this improved apparatus for boiling, evaporating, and concentrating syrups and other materials may be fully understood, the Patentee has further shown in figs. 5 and 6, other arrangements, in which there are some variations in the parts of the machinery. Fig. 5, is an end elevation of a steam engine and blowing apparatus constructed upon the oscillating principle, one of the receivers or heating chambers described at figs. 3 and 4, being shown in section; fig. 6, is a side elevation of the engine and blowing apparatus, with a vertical section of one of the open evaporating pans or boilers; fig. 7, is a horizontal view of the general arrangement of the whole apparatus.

Steam is conducted from the boiler or generator by the pipe O, fig. 5, to the hollow bearing *a*, of the engine cylinder A, from whence it passes into the steam box D, and is admitted by the slide valves through the steam passages to the interior of the cylinder, where, alternately acting upon the upper and under sides of the piston of the engine, it produces that reciprocating action of the piston which is communicated through its rod to the crank I, and thereby causes the rotary motion.

On the crank shaft of the engine (see fig. 6,) there are two other cranks K, which, by means of rods, give motion to the pistons of two air cylinders or injecting pumps J, J, which are shown as oscillating upon the bearings in the same manner as the engine cylinder; but the pumps may be made stationary, and the motion be communicated to

their piston rods through connecting rods and a parallel motion, or other means.

The air is admitted into the cylinders J, at the suction valves L, L, and is forced from the cylinders by the pistons through the pipes M, M, to the lower part of the receiver or heating chamber, shown at F, (see fig. 7,) and after passing around the steam pipes N, within the chamber F, the air having become heated, it proceeds in the way before described to the evaporating pans or boilers by the pipes H, there to produce the ebullition.

The steam, after effecting its purpose in the cylinder A, passes off by its other hollow bearing and through the pipe E, to the upper part of the receiver or heating chamber F; and if the quantity or temperature of the steam is not sufficient to heat the air to the required degree, then steam can be admitted direct from the generator by the pipe H, which is connected at its other end to the pipe G, leading from the generator to supply the evaporating pans or boilers.

It should be here observed that a second heating chamber might be added, receiving steam direct from the boiler; and the hot air being passed from the first receiver through the second, the temperature of the air might be raised to a sufficient height to effect the boiling or evaporation of the liquid or syrups by the hot air only without the agency of steam: this would, in some cases, be attended with considerable advantage. But if required, the steam from both these chambers, or from the valve, may, by a pipe, be conveyed into the heating tubes at bottom of the pan.

The evaporating or boiling pans R, are rectangular shaped metal boxes, into which are placed other similar shaped pans Q, of smaller dimensions, leaving a space between both at the bottom and the sides. Into this space

the hot air is admitted by the pipes P, in the manner before described, which rises through the small holes in the perforated bottom of the inner pan or boiler, and through the liquid or syrup contained in the inner pan. The holes in the perforated bottom are of a conical shape, the smallest opening being upwards ; they are thus formed to prevent the liquid or aqueous parts of the syrup filtering through, and filling up the space between the two pans.

The steam for heating the liquid or syrup in the pans is conducted by the pipes G, and after passing through the tubes or tubular grating S, placed over the bottom of the pan, it is received by the pipe T, and the condensed steam is conducted again to the boiler or generator, by the supply pump of the engine.

In order to afford greater facility to the working of the evaporating or boiling pans, instead of their being fixed upon standards as shown in the drawing, they may be made to hang or rest upon pivots, and turn upon them as bearings, which will allow the pans or boilers being placed at an inclination, so that the liquid or syrup may be allowed to run off speedily when the boiling or evaporating is over. For this purpose the pans or boilers may be made longer, and bear at one extremity upon a rotary shaft or axis, which will allow that end to descend, when a counterpoise lever attached to the other extremity is raised. There must be a cock or valve placed at this end, which may open as soon as the inclination of the pan takes place, when the whole of the syrup or liquid will immediately run off.

The main pipe which supplies the hot air to the bottom of the pans or boilers on this construction may be made with four branch pipes, like that belonging to the fixed pans ; but the cock with which it is furnished must form a centre round which the whole can turn, in order that the

ends of the branch pipes and the perforated bottom of the inner boiler may follow the inclination of the outer pan ; and during this movement the series of steam pipes at bottom of the pan may remain stationary, being suspended by joints to four vertical supports, which keep them in their proper position.

The inconvenience which may arise from the crystallisation of the syrups within the space between the outer and inner pans or boilers, or from the introduction of any portion of the syrup which might get there without being sufficiently boiled when the blowing ceases, may be obviated by making the perforated plate or bottom distinct from the pan, and placing a cock at the bottom of the outer pan, which is to be opened at the proper time, in order to empty the space from any liquid which may then be allowed to run off to a vessel placed beneath. And also to avoid the necessity of taking the boiler asunder, when it requires to be cleaned, there is a pipe  $z$ , communicating with the main steam pipe, and the space between the outer and inner parts by means of which steam may be allowed to enter between the bottom of the pans or boilers, which will melt all granulations that may form there, and also clean the whole of the chamber.

When this apparatus is used to evaporate saline liquors for the forming or crystallisation of salt, the hot air should be admitted into the liquor under operation from a square flat box placed in the midst of the liquid within the boiler, and perforated at the top and bottom with a great number of small holes. The hot air conducted from the receivers or heating chambers into this box passes rapidly through the perforations and incessantly agitates the liquors, and by this means produces a very rapid evaporation of the aqueous parts. There should be a space left of about twenty inches between the perforated box and the sides

of the pan, in order to allow the saline crystals to deposit themselves upon the internal sides of the pan or boiler.

The connexion between the box and the apparatus, should be formed so that it can be easily removed. The hot air admitted into the saline liquors will generally be found sufficient to effect the evaporation without the agency of the steam, consequently the steam pipes immersed in the pan can be dispensed with, but may be used if requisite.

The arrangement of the apparatus described, may also serve for the evaporation and concentration of sulphuric acids, but care must be taken that every thing which comes in contact with the acid should be made of lead.

This arrangement when adapted to the purpose of blowing air into liquids, in general greatly facilitates the introduction of the gas of different kinds into the liquids, which is often necessary in various manufactures ; for instance, carbonic acid, which may be employed instead of animal black in the refining of sugar. It is well known that this gas is obtained by the combination of sulphuric acid and carbonate of lime ; if, therefore, these two materials are put into a closed vessel, communicating on one side with the engine, and on the other with the reservoir of air, all the gas which becomes disengaged during the decomposition will be driven along with the air by the blowing apparatus to the receiver, and will be expelled thence into the evaporating pan.

It must likewise be observed, that it is indispensably necessary to place a safety valve on the ball *v*, which forms the point of junction of the conducting pipes for the hot air, in order to allow the air to escape, should it be found to be too much compressed in the receiver where it is heated.

Instead of the internal pan with a perforated bottom, a double box perforated above and below may be suspended at about half an inch from the bottom of the pan.

The second application of this improved arrangement of apparatus is to evaporate or boil in vacuo, that is in a closed vessel, pan, or boiler, heated by a steam bath, to which is added an air pump, for the purposes of producing ebullition as before described, as well as the pump to obtain a partial vacuum within the pan or boiler. The additional air pump is employed to draw off the hot air from the pan, together with the aqueous parts of the syrups or liquors which rise from them in the form of steam when under evaporation. The object of this arrangement of apparatus is to accelerate the boiling and evaporation which may be too slow by the usual proceedings in vacuo, and to allow of the liquid or syrup, after the evaporation, being brought to the degree of heat requisite, before it is run off into the moulds or forms, thus avoiding the necessity of heating the moulds afterwards in a separate apparatus.

In this improved arrangement of apparatus, the evaporation takes place at a very low degree of temperature; and as soon as the boiling is completed, the temperature of the syrups can be raised to the requisite degree, before the liquid goes out of the evaporating pan to the moulds or forms. Figs. 8 and 9, show this arrangement of the apparatus for effecting these objects. Fig. 8, is a vertical section taken through a sugar evaporating pan or boiler. Fig. 9, is a side elevation. A is the pan containing the syrup to be evaporated, in the centre of which is placed a hollow vertical spindle B, passed through stuffing boxes, and capable of turning freely, which carries four horizontal hollow arms C, communicating with the hollow part of the spindle, and from these hollow arms a great number of

perpendicular tubes *b*, descend, which are perforated with small holes. At the top of this spindle *B*, the hot air pipe is to be connected, by means of which air will be conducted to the horizontal arms *C*, and also to the perpendicular tubes *b*, *b*, *b*, *b*. Upon the upper part of the hollow spindle *B*, a rigger or toothed pinion is fixed, for the purpose of communicating a rotatory motion to the spindle, and the air tubes *c* and *a*, *b*. By this rotatory motion, the syrup or liquid contained in the pan will be constantly agitated, and the air passed through the tubes will be brought into contact with all parts of the liquor under operation; and as soon as the air emitted from the tubes has risen through the liquid mass, it is carried off by an exhausting air pump connected to the pipe *H*, together with the steam issuing from the syrup.

The air pump should be of sufficient capability to effect the exhaustion of the air and steam in order to produce the required partial vacuum in the pan.

It will be evident that by the operation of the exhausting pump, the air in the evaporating pan will be rarified, and that there will be a partial vacuum formed in the pan or boiler; and thus the liquid heated by the steam which is admitted into the bath between the double bottom from the generator by the pipe *D*, is constantly agitated by the rotation of the tubes and the ebullition of the air; and that the interior of the pan being rarefied, the evaporation of the syrup is more expeditiously effected than by any other apparatus for boiling or evaporating in vacuum. The condensed steam may be removed from the bath by a cock inserted into the bottom of the outer pan.

There is a vessel *F*, placed upon the top part of the pan or boiler furnished with a valve, through which the syrup or liquid can be supplied to the pan or boiler: *G*, is the discharging valve for the exit of the syrup when suffi-

ciently boiled. There is a cock placed upon the pipe H, which communicates with the exhausting air pump, and is for the purpose of regulating the passage of the hot air and steam from the boiler to the air pump, and by means of which a greater or less vacuum can be obtained in the evaporating pan or boiler.

The third application of this improved apparatus is designed for the purposes of distillation, and is susceptible of different arrangements of the parts, which, although intended for the same purposes, and effecting the same objects, are somewhat different in their construction and forms. Fig. 10, shows a vertical section taken through the principal parts: I, is an alembic; it may be of any convenient shape, which is accompanied by the requisite accessories for preventing a loss of the spirituous parts arising from the boiling or evaporating of the wash or low wines, which otherwise would be carried off by the current of either hot or cold air intended to be used in distillation, with the assistance of steam.

The object of this apparatus, like the former, is to accelerate the evaporation of the liquids to be distilled, the operation being carried on at a lower degree of temperature than is commonly practised.

Hot air is conducted from the receivers or heating chambers before mentioned through the pipe F, which is divided into four syphon branches a, a, within the still, passed through the bottom of the alembic upwards into the still head, and from thence descending to the chamber b, b, under the perforated disc or plate c, shown in the horizontal view, fig. 11. Over this plate is placed the tubular grating or series of pipes G, into which steam is introduced from the generator by the pipe H, to heat the liquid or wash in the alembics.

The hot air, on leaving the syphon tubes a, passes up

through the small holes of the perforated plate *c*, and produces the same effect as before described, that is, raising and agitating the liquid, and thereby facilitating its evaporation. The vapour emitted rises into the head of the still *I*, and passes from thence to the condensing worm *J*, placed in a vessel filled with cold water.

The lower extremity of the pipe *I*, is connected to another pipe *K*, which is divided into two branches, one of which descends to the bottom of the vat *L*, where it conveys the liquid produce of the distillation, and the other rises and communicates with a vessel *M*, into which it conveys the hot air, steam, and spirituous vapours which have escaped from the liquid, and are still uncondensed in the worm.

This vessel *M*, contains either cold water, or phlegms, or low wines, up to about half its height, and is divided in its lower part by three horizontal plates *N*, *N*, *N*, which plates are perforated with a multitude of small holes. The pipe *K*, passes through these three plates, and conducts the air and steam to the bottom of the vessel.

The object of these perforated plates is to arrest the vapour as it rises, and causes it to deposit all the spirituous parts which it contained in the liquid occupying the vessel.

A chamber *P*, of any suitable shape, is placed above the vessel *M*, into which the air passes from *M*, for the purpose of condensing any spirituous vapour it may still be loaded with; the condensed spirit returning to the receiver by means of the cock *n*. There is also a syphon tube *O*, *O*, leading from the upper part of the vessel *M*, which tube should be about half filled with water; this is intended to act as a safety valve for the escape of the air from the receiver *M*. There may be a pipe *R*, connected to the top of the vessel *P*, which may lead to the suction valve of the injecting air pump; the object of this would be to receive the remains of the spirituous parts with which

the air may be yet charged, and thus return them to the alembic. The air finally makes its exit by the valve S.

It may here be remarked that cold air may be used instead of hot air, in which case it may be forced direct from the blowing cylinder to the bottom of the alembic; and it is to be observed that the vessel M, should be placed at a proper elevation, so that the liquor, if required, may be conducted by a pipe back into the alembic or still.

In distilleries where a steam engine is not used, the alembic may be heated by a common fire; and a coiled pipe might be passed through the fire, by which pipe the air might be conducted previous to its entering the alembic.

Figs. 12, 13, and 14, show another arrangement of the parts of this apparatus as applied to distillation. Fig. 12, is a side elevation, exhibiting the whole arrangement of the apparatus; fig. 13, is a vertical section; and fig. 14, a plan view of the same. The air receiver, or heated chamber, shown connected to this apparatus, is similar to that described before; and the steam which serves to heat it is admitted by the cock E. This cock has three ways or passages, in order that it may not only serve to conduct the steam from the generator into the reservoir, but also allow it to pass through the tube F, to the other parts of the apparatus when necessary. The whole of the condensed steam is intended to escape by the pipe and cock G.

The alembic or still which contains the materials to be submitted to the process of distillation, consists of a close vessel A, in which is placed, at a little distance from the bottom, the perforated plate *a*. The hot air is admitted into the still by the curved pipe D, which is divided into four branches, projecting into the boiler as far as the plate *a*; the arrangement of which is best seen by the detached horizontal fig. 15. Air forcibly driven by bellows

into the chamber below, passes through the plate into the liquid, which it constantly agitates, and afterwards rises to the top of the still, carrying with it the spirit which has been evolved during its passage: I, is a coil of tubes shown more particularly in the sectional fig. 13, placed in the liquor above the perforated bottom, and in which the steam conducted by the tube J, circulates. The steam, after having passed through the coiled tubes, leaves them by another tube K, from whence it may be conveyed back to the generator.

The air charged with the alcoholic vapour leaves the boiler by the pipe L, which conveys it into the condensing worm M, enveloped with cold water; from this worm it passes to the closed chamber N, where the air ascends to the upper part, whilst the portion of the vapour that has been condensed descends into the chamber O.

In order that the process of condensation may be more completely effected, if any portion of the vapour issuing from the worm has not been sufficiently cooled, and should be carried away with the air, it will ascend and strike against the dome of the closed chamber N, or the cap b, and will then fall to the bottom in a condensed form.

Finally, if some positions of the spirituous parts pass off by the pipe P, (which, when its cock is open, allows the air to escape,) on reaching the globular chamber a, the vapour undergoes a further condensation. This chamber may be connected to another condensing chamber, as shown in the drawings, or to the pipe which conveys the air back to the blowing apparatus, and is provided with a safety valve c, which allows it to escape when the pressure is too great.

The distilled spirit passes from the chamber O, through a second condensing worm R, enclosed in a vessel filled with cold water, and makes its exit by the tube d, into the

cylinder S, whence it finally reaches the reservoir T. The vessels which contain the condensing worms are supplied with cold water at the lower part, and the heated water escapes by the pipe e.

The alembic still or boiler is provided on the outside with a glass tube F, which shows the level of the liquor within. The wash or low wines are introduced into the alembic by the pipe V, at the upper part, and the alembic is emptied by a cock X, near the bottom. A second Y, communicating with the space between the perforated plate and the bottom of the alembic, is placed lower down, and serves to empty the double bottom when necessary. The steam which issues from the grating enclosed in the boiler, as well as that which might escape from the tube F, may serve to heat the vessel containing the low wines, in order to keep it to a proper degree of temperature.—[*Entered in the Rolls Chapel Office, December, 1833.*]

Specification drawn by Messrs. Newton and Berry.

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*To JOHN GUNBY, of George-street Sand-pits, Birmingham, in the county of Warwick, artist, in consequence of his having invented an improved method or methods of combining glass with metal, metals, or other substances, applicable to various useful and ornamental purposes.—[Sealed 11th February, 1831.]*

THE subject of this patent is a mode of ornamenting the surface of metal with cut glass, which is proposed to be applied to decorating vases, cups, candlesticks, and other articles intended to be employed for show, and on grand occasions. The Patentee states that the invention is

applicable to the construction of a great variety of articles suited to table services for banquets, to furniture for state apartments, and for utensils to be employed in religious ceremonies (of the Roman Catholic church we presume). The superb *Clarence Vase*, which has lately been exhibited in London, was constructed upon the plan proposed by the Patentee.

The mode of carrying this invention into effect, is illustrated in the Specification by one example only; but the same method may be adapted to suit a great variety of articles, and may be applied to various forms, according to the taste of the manufacturer.

A vase is to be formed of metal, and plates or tablets of glass, cut to the designed figures, are to be bent, by heat, in the ordinary way of glass bending to fit the external shape of the vase. These tablets of glass, when so bent, are each to be cut or ground on both surfaces to any desired pattern, and then severally fitted to a shell or thin plate of metal of the same dimension and figure as the glass tablet; and after painting the inner surface of each tablet of glass with varnish colour with any pattern or device, the glass is to be cemented to the bent metal plate, or fastened by turning up the edges of the metal, when they will be in a condition to be attached to the surface of the metal vase. Small studs are to be soldered to the back parts of the bent metal plate, which studs, passing through the substance of the vase, when attached, will hold and connect the glass tablets firmly to the surface of the vase, and produce the desired external ornament.

In this way the whole surface of the metal vase may be covered by the attachment of several tablets or pieces of cut and painted glass previously bent to the figure of the vase; or the form of the vase or any other article may

be produced by a mere frame or skeleton, to which the several pieces of the cut glass may be attached in the way described.

The Patentee says, that he claims connecting glass with metal or other substances, in any fit and proper manner, according to the intent of the article to be made.—[*Enrolled in the Inrolment Office, August, 1831.*]

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*To HENRY DAVEY, of the parish of St. Giles, Camberwell, in the county of Surrey, gentleman, for certain improvements in machinery or apparatus for preparing linen and cotton rags, and other materials used in the manufacture of paper, being a communication from a foreigner residing abroad.—[Sealed 28th September, 1833.]*

THESE improvements in machinery or apparatus for preparing linen and cotton rags, and other materials used in the manufacture of paper, consist in the arrangement of certain mechanical parts heretofore well known as applied to other uses, but which as a whole are made to constitute a new machine suited to the operation of cutting, tearing, and cleaning rags for the purposes of making paper.

The machine consists of an endless feeding cloth, by which the rough rags supplied by the attendants are progressively conducted forward to a pair of feeding rollers, and on passing through these rollers the rags are submitted to the operation of rotary cutters, acting against a fixed or ledger blade, which cut and tear them into small

pieces; from whence the rags, having been so cut and torn, are allowed to slide down an inclined sieve, which is put in a state of agitation.

By these means the dust and greater part of the dirt from the rags is sifted through, and the small pieces of rag are delivered on to a horizontal sieve or sorting table, where they are examined, and if any large pieces of rag happen to have escaped the cutters, those pieces are returned into the machine to be again operated upon until they are found to be in a state ready for the pulp engine.

In Plate IX, fig. 1, is a longitudinal section taken through the middle of the machine. An iron or other suitable frame, consisting of side standards *a*, *a*, with transverse bars secured to the sides by screw-nuts, constitutes the framework or support of the machine. Two wood rollers *b*, *b*, carry an endless cloth *c*, on to which cloth the rough rags are supplied by attendant women; and these rollers being made to revolve, by means hereafter described, the rags are progressively conducted forward and introduced between the pair of feeding rollers *d*, *d*, which are of iron or other hard material, and one or both of these may be grooved or fluted in the direction of their axis, for the purpose of taking more firm hold of the materials.

These rollers *d*, *d*, are connected by toothed gear, as shown by dots, and therefore revolve together in opposite directions. By their rotation they receive the rags from the feeding cloth, and conduct them through to the edge of the fixed cutter or ledger blade *e*, which is secured to a transverse bar *f*, extending across the frame of the machine.

A pair of circular rims or wheels *g*, *g*, fixed upon the rotary shaft *h*, carry a series of knives *i*, *i*, placed diagonally to the axis: the ends of these knives are secured to

the circular rims by screws; they are so fixed upon the rims, and also the axle is so accurately adjusted in its bearing, as to cause the knives, as they revolve, to pass in close contact with the fixed cutter or blade *e*, and by so doing to produce the operation of shears.

A sufficient moving power, as that of a steam engine, a water wheel, a horse, or manual labour, being applied by a band to a rigger upon the shaft *h*, or by a winch to the end of the said shaft, the cutters *i*, *i*, *i*, are made to revolve and to act against the fixed blade in the way already described; and a pinion *l*, upon the shaft, taking into the toothed wheel *m*, fixed upon the end of the lower feeding roller, gives that rotary motion to those rollers which brings the rags forward from the feeding cloth *e*, and presents them on the top edge of the ledger blade *e*, to the cutting action of the rotary cutters *i*, as they pass.

From the cutters the pieces of rag fall down on to an inclined sieve *n*, which is agitated for the purpose of shaking out a great portion of the dirt from the rags. This sieve is mounted at its lower part upon an axle or hinge joint *o*, and at its upper part is supported by straps *p*, *p*, suspended from the levers *q*, *q*.

These levers *q*, *q*, vibrate upon fulcrum pivots *r*, *r*, inserted into the ends of a transverse rail, supported upon blocks mounted on the standards; the vibratory action of the levers being effected by rotary tappets *s*, *s*, upon the shaft *h*, which act under the ends of the levers. As the shaft *h*, goes round, the tappets lift the levers *q*, *q*, at intervals, and then allow them to fall suddenly; by which means the sieve has a rapid up and down motion, which not only shakes out the dust, but carries the rags down on to the horizontal sieve or sorting table *t*, whence they may be taken without any further operation of dusting, and placed in the engine to be washed and reduced into pulp.

I have said that a series of rotary cutters may be employed, but I do not at all times find it necessary to employ more than two moving blades, though a greater number may be employed in the same way, if desired.

The progressive movement of the endless cloth may be effected by a pulley *v*, fixed on the end of the lower feeding roller, from whence a band may be passed to a similar pulley on the end of the first of the wooden rollers *b*, which being by that means made to revolve, will cause the feeding cloth to travel, and the rags to be progressively delivered to the feeding rollers.

I would add, that if by the operation of the machine some of the rags, in passing through a first time, should not have been cut or torn sufficiently well, such large pieces may be carried back again to the feeding cloth and passed through the machine a second time, in order to reduce them to any required degree of fineness.

Having described this improved machine or apparatus for cutting or preparing rags to be used in the manufacture of paper, I wish it to be understood that I do not mean or intend to confine myself to the precise form or construction of the several parts, as the same may be varied to suit different kinds and qualities of material to be operated upon; and further, that several additional parts might be added to this machine, which would render its working still more complete, and perform several different operations at the same time that the cutting of the rags or other material takes place. For instance, under some circumstances it may be desirable to place between the rotatory cutters above described, one, two, or more projecting beaters, which, as they revolve, shall strike or act upon the rags or other material as they are delivered from the feeding rollers to the cutters, and thereby remove or strike off any dirt or other extraneous matter ad-

hering to the material under operation, which will help to cleanse the same, and render the material more fit for the subsequent operations of manufacturing it into paper.

And further, there may be a rotatory fan or other blowing apparatus adapted to this machinery, which shall cause a current of air to operate upon the material as it is delivered from the rotatory cutters, whereby the lighter particles, which would otherwise be either carried away by the agitation of the air produced by the revolution of the cutters, or fall through the meshes of the sieve with the dirt or other foreign matter, may be separated from the dirt or other extraneous material, and collected and afterwards carried to the subsequent operations in the manufacture of the material into paper. And I would further remark, that although I prefer vertical rotatory cutters, from their being the most simple in construction and most readily kept in proper order, yet it will be evident that cutters or blades having a horizontal rotatory motion may be adapted to this machine with good effect; and also that blades with a vibratory or up and down cutting motion may be employed instead of those fixed on a rotatory shaft.

Having now described the particular construction and arrangement of this improved machine, I need only remark that it is evident it may be made to operate upon the various fibrous materials used for the manufacture of paper; such as the thrums or ends of yarn of woven cloth, woollen goods, rope yarn, sacking, and other fibrous material.—[*Enrolled in the Rolls Chapel Office, March, 1834.*]

Specification drawn by Messrs. Newton and Berry.

*To WILLIAM JESSOP, of Butterley Hall, in the county of Derby, Esq., for his improvements in constructing railways.—[Sealed 1st June, 1833.]*

THE Patentee states that this invention relates to the manner of constructing the chairs in which the rails are fixed. In place of the usual mode of fixing and supporting the chair upon a stone block, wood, or other sleeper, the chair is made distinct from the pedestal, which is attached to the stone block or other sleeper; and the chair and pedestal are connected by a universal joint or hinge, which permits the pedestal to adapt itself to any irregular sinking of the block or other support upon which it rests, and ensures a firm and solid bearing on its base; or it may be effected by the combined motion of a hinge joint or other means, permitting motion between the pedestal and the chair, and a moveable joint formed at the junction of the chair and rail, so as to produce the same effect, and thereby answer the purpose of a universal joint.

Plate IX, represents the rail and its appendages, in several figures exhibiting simple methods of constructing the universal joint. Fig. 2, is a side view of the rail mounted upon stone blocks, one of which blocks it will be seen has sunk out of its level position. Fig. 3, is a plan or horizontal view of a portion of the railway, showing both rails and the sleepers by which they are supported. Fig. 4, is a transverse section of the rails with their connecting bar and the sleepers on which they are mounted, one of the sleepers having slipped out of its correct horizontal position, by which the effect of the jointed bearing will be seen; *r, r*, are the rails, *c, c*, the chains, *p, p*, the pedestals, *b, b*, the block or sleepers,

*j, j*, the junction or transverse connecting bars by which the opposite chairs are connected together, and the rails are held parallel to each other.

Cast iron beds or sleepers *s, s*, with suitable jointed pedestals, may be employed to support the rails in situations where stone might be too expensive. In this construction of sleeper the pedestal may be readily adjusted by the introduction of a wedge or packing, so as to bring it to the proper level without disturbing the settled position which the bed plate may have acquired on the ground, the same kind of jointed bearing being attached to the iron pedestals as to those fixed in the stone blocks.

Figs. 5 and 6, are sectional representations of the jointed pedestal and chair, by means of which joint the pedestal adapts itself to any irregular sinking of the stone block or other sleeper, and at the same time allows the connecting transverse rails to retain their proper places.

Figs. 7, 8, and 9, are other views of the pedestal and chair, explanatory of its particular construction.

Figs. 10, 11, and 12, are a plan, elevation, and vertical section of the cast iron bed plate used as a substitute for the stone block, in which will be perceived the method of adjusting the rails by means of wedges or packing introduced between the bed plates and the base of the pedestal, which is made to fit in the recesses formed in the bed plate, and secured laterally by means of a wedge or key.

The Patentee says, in conclusion: Having now described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that I lay no claim to various parts shown and described; but I do hereby confine my claim of invention of improvements in constructing railways, to the using of chairs and pedestals which are capable of turning or

moving on universal or other similar joints, as above described, whereby the railways will not be so liable as heretofore to be damaged by the sinking of the blocks or sleepers, whether of stone or wood, iron, or other materials.—[*Inrolled in the Inrolment Office, December, 1833.*]

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*To SAMUEL PARKER, of Argyle-street, Oxford-street, in the county of Middlesex, bronzist, in consequence of a communication made to him by a foreigner residing abroad, and improvements made by himself, for an invention of certain improvements in producing mechanical power from chemical agents.*—[Sealed 29th June, 1830.]

THE subject of this patent is the adaptation of a principle already known, to a purpose for which it had not been before applied, namely, generating an elastic gas by the chemical decomposition of two substances, and applying the elastic force of the said gas, when so produced, as a mechanical power to move bodies.

The Patentee considers that by the adaptation of this principle, very considerable power may be obtained, and that it may be applied with advantage in a variety of ways. We decidedly differ from him in this particular ; and though we admit the ingenuity of the adaptation, yet we deny its capability of producing power for any useful purpose.

In the Specification of this patent the application of the power is only shown as adapted to raise the very small supply of oil required to feed the burner of an Argand table lamp. The construction of the lamp is upon the pneumatic principle, that is, the surface of the oil in the reservoir being acted upon by the elastic pressure of air

confined in a close vessel, the gradual supply of oil is forced up a central column to the wick in the burner.

The mode by which this elastic air or gas is produced, forms the leading feature of the invention. A close vessel is provided in the lower part of the lamp, which is partially occupied with diluted sulphuric acid. A small pin or cylindrical piece of zinc, conically pointed at the lower part, is perpendicularly supported on its point in such a situation within the vessel that the point or conical part only of the pin of zinc should be immersed in the diluted acid. The chemical action which necessarily takes place between the acid and the zinc, causes hydrogen gas to be evolved, which gas, on rising into the reservoir of oil, exerts an elastic pressure upon the surface of the oil, and forces it up the tube to the burner.

As the decomposition of the conical end of the pin of zinc goes on, the pin gradually descends, its lower extremity or point constantly bearing upon a permanent support below; and as the substance of the zinc is progressively decomposed by the corrosion of the acid, gas is continually rising from the chemical action, and hence constantly exerting an elastic force upon the surface of the oil in the reservoir.

In order that the pressure of the elastic gas upon the surface of the oil shall be uniform, it is necessary that the quantity of gas generated in given spaces of time shall be uniform also, to effect which object the end of the zinc pin is made conical, and bearing upon its point in the acid, so that as its conical surface is eaten away it may gradually descend into the solution, and present the same area or extent of surface to the action of the acid as long as it remains immersed therein.

In this way the Patentee proposes to obtain power for motive purposes, the application of which he claims gene-

rally, whatever may be the form of the apparatus in which the gas is generated, and to whatever purpose the pressure of the gas so obtained may be applied.—[*Inrolled in the Inrolment Office, December, 1830.*]

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*To SAMUEL PARKER, of Argyle-street, Oxford-street, in the county of Middlesex, bronzist, in consequence of a communication made to him by a foreigner residing abroad, and improvements made by himself, for an invention of an improved lamp.—[Sealed 1st July, 1830.]*

THIS is called an *aero fountain lamp*, that is, a lamp in which the oil is forced up to the burner by the pressure of a volume of air, commonly denominated a pneumatic lamp.

We have perused the Specification of this patent with considerable care, but have not been able to discover the particular features constituting the improvement. The general arrangements of the parts of the lamp appear to resemble those of other pneumatic lamps. There are two oil chambers, the one at bottom, from which the burner is immediately fed, the other receiving the overflow, and these communicate with each other; but by what means an increased pressure of air is to be brought into operation upon the surface of oil as its volume diminishes, by combustion, we cannot discover; indeed, the construction of the passages and the vessels do not appear to be so described in the specification as to render any novel feature evident, or the intention of the Patentee at all obvious.

The Patentee says, as regards this invention, that he does not claim “the principles of the fountain lamp, or any of the parts which have been used before, but claims

the arrangement of the parts as a whole forming an improved lamp," so that we are left entirely in the dark as to its novelties or advantage.—[*Enrolled in the Enrollment Office, January, 1831.*]

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*To JOHN LANGHAM, of Leicester, lace-manufacturer, for his improvements in machinery for manufacturing bobbin net lace.—[Sealed 17th December, 1832.]*

THIS invention applies to that particular construction of machinery for making lace, known by the name of "Lever's hand machine." In the usual construction of machines upon this principle, the lace is produced by a succession of five distinct movements, that is, the workman causes the handles on the front landing bar to be raised and depressed four times in succession, by which the necessary movements are given to such parts of the mechanism as produce the twisting of the threads round the series of points; and by means of a fifth movement given to certain parts of the machinery by the workman pressing down a treadle with his foot, the operations called the taking up and dividing are performed, which are well known to workmen in the lace trade.

By the proposed improvements adapted to a Lever's machine, it will not be necessary, as in the ordinary construction, to stop the other parts of the mechanism while the treadles are brought into action to produce the taking up of the lace by the points, and the dividing of the carriages at each half of the meshes, such taking up and dividing being effected simultaneously with the other of the movements of the machine. The invention, therefore, is

to be considered as consisting in certain improved parts added to an ordinary Lever's hand machine, as shown in Plate IX.

Fig. 13, represents a section taken through the middle of an ordinary Lever's hand machine, that is, a machine worked by ordinary handles affixed to a front landing bar, in contradistinction to a machine worked by a rotatory motion, whether by the hand or mechanical power. Fig. 14, is a back view of some of the parts situate near the middle of the machine, but in neither of the figures is it thought necessary to show more of the machine than is essential to represent improvements and the manner of applying them.

In each of the figures representing this machine the same letters refer to similar parts: *a*, is an ordinary treadle, being the only one used in this improved machine; this treadle acts merely as an assistance to the handles on the landing bar, the foot relieving the hands of part of the weight; *b*, is a connecting rod to a lever *c*; this lever *c*, has its fulcrum at *d*, on a perpendicular standard *e*, affixed to the main framing of the machine; *f*, is called a lifter; it is attached to one end of the lever *c*, as shown in fig. 13, the object of this lifter being to lift out the parts which work the points.

In fig. 14, it will be seen that *g*, is an axle having bearings in the standard *h*, *h*. On this axle are affixed the wheels *i*, *j*, (one of which, *i*, is shown separately in fig. 15,) in which figure it will be perceived that there is a fall or recess *k*, in the periphery of the wheel, the use of which will be hereafter described. The wheel *j*, has a similar recess; and it should be observed that the falls *k*, of the two wheels are set opposite to each other, so that as the shaft or axle *g*, revolves, the falls *k*, come alternately into action.

There is a ratchet wheel *l*, called the driving wheel, fixed on the shaft or axle *g*, and shown separately at fig. 18, which wheel is equally divided into eight teeth, and one of the teeth or ratchets is moved onward at every vibration of the handles by means of the click or driver *m*, see fig. 13, which is worked by the lever *c*, and the treadle *a*. A rod or bar *o*, connects the lever *c*, to the cranked lever *p*, which cranked lever *p*, has its fulcrum at *q*, in the standard *e*.

These parts it will be seen, are connected by screws and nuts, but allowed to turn, and are capable of adjustment in consequence of the slots cut in the various parts, and such is the case throughout the machine where requisite, as shown in the figures, and will not, therefore, require to be again mentioned.

The other end of the cranked lever *p*, is connected by means of a rod or bar *r*, to the lever *s*, which forms part of the ordinary drawing tackle, such drawing tackle being connected in the ordinary manner with the front and back landing bars.

The lever *s*, has its fulcrum at *t*, in the bearing *v*, which is affixed to the back rafter or tie *u*, and to the other end of the lever *s*, is affixed the half jack or the drawing tackle link *w*, which is also connected to the back landing bar in like manner, as is usual in the ordinary machine: *x*, *y*, are two levers, having each of them a fulcrum at *z*; these levers *x*, *y*, are connected to the spindle bars, which work the point bars by means of the connecting bars or rods *A*, *A*, and the back arms *B*, *B*, the levers *x*, *y*, being supported by the brackets *C*, which descend from and are affixed to the back rafter or tie *u*. These levers *x*, *y*, are constantly pressed down by the weights *D*, which act as counter-balances to the point bars.

*E*, *E*, are two friction wheels or trucks, one on each of

the levers  $x, y$ . These wheels have their axes on the levers  $x, y$ , respectively ; and the friction rollers or trucks E, E, bear upon the circumference of the two wheels  $i, j$ , by which means the levers  $x, y$ , are kept to the position shown in the figure till after every fourth movement of the handle of the top landing bar, when one or other of the wheels E, will be lowered down by the lifter f, into its respective fall k, in the wheels  $i$  or  $j$  ; and by this alternately coming into the position of the falls k, one or other of the levers  $x, y$ , is permitted to be lowered by the lifter f, which causes one of the point bars to be brought down at the proper time to take up the twist just made, and the point bar which is lowered by the descent of the wheels E, into the fall k, will be raised up again by means of the lifter f, coming under the other friction wheel or truck on the end of the lever  $x$  or  $y$ , whichever may be the depressed one at the time, and thus take up the half mesh which has been formed.

In the meantime, whilst the point bar is descending, the divide is accomplished by the following means :—On the wheel  $i$ , are affixed two inclined planes G, (see fig. 15,) which alternately come in contact with the tail of a bent lever H, which turns on a fulcrum I, on the standard J, affixed to the main framing of the machine. This lever H, is actuated twice every complete revolution of the wheel  $i$ , and the object thereof is to move a sliding bar on the back pusher bar. This sliding bar is shown in the detached fig. 17.

On to one end of the sliding bar is placed a screw R, which forms a stop in the way of the half jack w, which attaches the drawing tackle to the back landing bar, as before described, the screw R, on the sliding bar being pressed against by the half jack w, every fourth movement at the going down of the handles causes the back pusher

bar to be forced inwards every fourth movement, and at the same time the wheel E, on one of the levers x, y, is lowered into its fall k, for the purpose of bringing down one of the point bars.

It should be observed that the divide in the machine, when worked by these improvements, is accomplished alternately by the back and front pusher bars, but this does not form any part of the present invention. In order to cause the front pusher bar to push in at every fourth movement of the handles, a small wheel, shown detached at fig. 18, on the axle of the catch bar wheels, is applied. On this wheel are cut two falls L, L; and this wheel is caused to turn one-eighth at every motion of the machine by the driver which works the catch bar wheels; consequently one of the falls L, receives a small truck or friction wheel M, which is attached to the end of the front pusher bar, there being a small guide or shield N, in front of each fall L, which guides the truck or friction wheel M, into the fall L, and thus this pusher bar falls inward every fourth movement; at the same time the back pusher bar is forced in by the half jack w, coming in contact with the stop or screw R, on the sliding bar, as above described; and according as the carriages are situated, they will be divided by the front or back pusher bar.

In dividing the carriages whilst they are in the front or back combs, there is a hazard of the carriages (whilst in a rapid motion) springing, and being passed by the pushers. To prevent this effect there is applied a safety bar in connexion with the pusher or dividing bars, whereby the whole of the carriages are forced inwards till they are wholly or sufficiently within the combs, at which period the pushers commence dividing the carriages by pushing every alternate carriage.

Fig. 19, shows, upon an enlarged scale, one of the car-

riages in one of the combs, and also one of the pusher bars in section : X, is the safety bar above mentioned, which runs from end to end of the pusher bar, and is supported just under the pushers, as shown in this fig. by rods Y, which pass through the pusher bar ; and these rods have projecting heads, and are pressed at all times inwards by the springs Z, which are affixed to the backs of the pusher bars.

The bars X, are also supported on the underside by projecting pieces W, affixed at proper intervals to the pusher bars ; and it should be observed that there are stops at each end of the machine, that is, at the ends of each row of combs, against which the bar X, comes at the time of making the divide, or otherwise the bar X, would rest against the tails of the combs, and might, by the constant action against their tails, produce an injury.

It will be evident, from this arrangement, that as the pusher bars fall in to make the divide, the bar X, will first come against the carriages, and push the whole row till they are wholly or sufficiently within the combs, at which time the bar X, will either rest against the tails of the combs, or the stops before mentioned, which will prevent the bar proceeding further, whilst the pusher bar will be enabled to continue its movement by the springs Z, permitting the rods affixed to the bar X, to protrude through the pusher bar, as will be evident on inspecting the arrangement of parts.

On the pusher bars receding from each other, the springs Z, will force the bars X, again into the position shown in fig. 19, that is, projecting slightly in front of the pushers, so that at all times when the divide is to take place, the whole of the carriages will be first driven into the combs before the divide commences : and it is here to be observed, that the number of the rods Y, and the springs Z, will

depend on the width of the machine; three or four on each pusher bar have been found sufficient.

In producing the divide at every fourth motion of the machine when worked by these improvements, it is necessary that such fourth movement should be shorter than the other three, that is to say, that the landing bars should not descend to their old stops; and in order to effect this there is affixed a small tail piece or stop on the back landing bar, which is stopped at every fourth movement by coming in contact with apparatus similar in construction to the half stop tackle used in hand circular machines.

A lever O, having its fulcrum at P, on the standard, has a stop Q, hinged to it, which rests against the middle tie bar, as shown in fig. 13. This lever O, is depressed every time that either of the wheels is lowered into its fall *k*, on the wheel *i* or *j*, in the following manner:—K, fig. 14, is a piece of strong wire passing through the axle or shaft *g*, in such a manner as to project on each side of that axle or shaft; therefore as that axle or shaft turns round, the projections K, come successively in contact with and force down that end of the lever O, every time the divide takes place; and by thus depressing the lever O, the stop Q, is raised, which comes under the tail piece or stop affixed on the back landing bar, and thus prevents its falling to its regular stops; but in the three first movements, the stop Q, not being acted on, the stop or tail piece affixed to the back landing bar passes over the stop Q, and the landing bars are received on the old stops.

It will be desirable here to remark, that the front fetcher bar, when worked in the ordinary machine without these improvements, rests on the top of the cogs of the catch bar wheels at the time of making the divide from the back and front fetcher bar, and is permitted to fall by the foot of the workman depressing the treadle, and thus

causing the driver to move the catch bar wheel sufficiently forward to allow of the fall of this fetcher bar; but when worked according to the improvements, the back wheel is made the same as the front one, so that the motion of depressing the treadle is rendered unnecessary, as the wheels will be forced sufficiently forward by the drivers to admit of the falling in of the fetcher bars immediately after the divide has been effected; and at the moment the tail piece or stop affixed on the back landing bar comes in contact with the stop Q.

The Patentee says, "Having now described the nature of my improvements, and the manner in which they are applied to and connected with the ordinary parts of a Lever's hand machine, I will proceed to describe the action which will take place in producing the various movements.

" Supposing the workman to be sitting on his seat in front of the machine; he will place one foot on the treadle for the purpose of relieving his hands of part of the weight, permitting the foot to rise and fall with the motion of the handles. In fig. 13, the machine is represented in the position the parts would be in at the time that one motion of the handles has been made after a divide has taken place; and this first motion has formed the cross or traverse of the bobbin threads; the driver *m*, has forced the driving or ratchet wheel *l*, one tooth, and the lifter *f*, will have raised the wheel *E*, on the lever *x*, out of the fall *k*, in the wheel *i*, and thus have taken the back point bar.

" The next or second movement of the handles (up and down) will cause the bobbins to twist round the warp threads as usual, and the driver *m*, drives the driving wheel *l*, another tooth. The following, or third motion, gives another lap or turn of the bobbins round the warp threads, and the driving wheel is driven another tooth by

the driver *m*. The fourth motion of the handles completes the twist as usual, whilst at the same time, by the upward movements of the handles, one of the inclined planes on the wheel *i*, comes in contact with the lever *H*, which moves the sliding bar on the back pusher bar, and thus brings the screw or stop *R*, thereon opposite to the half jack *w*.

"The wheel *E*, on the lever *y*, is lowered down by the lifter *f*, and at the same time one of the projections *K*, on the shaft or axle *g*, comes in contact with the lever *O*, and depresses it, and thus raises the stop *Q*, to prevent the landing bars going down to their original stops, as before described. By bringing down the handles to complete the fourth motion, the half jack *w*, pushes against the stop *R*, on the sliding bar, and forces the back pusher bar inwards, whilst the front pusher bar is put in by a friction wheel affixed at the end thereof, being guided into one or other of the falls *L*, in the wheel, fig. 17, as before described, and thus produces the divide on whichever side the carriages are placed, the carriages being first driven sufficiently far into the combs by the bar *X*; and in lowering the handles the lifter *m*, descends and lowers the lever *y*, till its wheel *E*, is received by the fall *k*, in the wheel *j*, and thus brings down the front point bar."

It will be perceived that the lifter, although it is worked up and down at each motion of the handles, yet it only comes into action at proper times for lowering and raising the point bars. At the fourth motion, as above described, the lifter *f*, lowers the end of the lever *y*, and thus brings down the front point bar; and by the next, or first motion of the handles, the lever *y*, will be raised, and this will put up the front point bars, and by this first movement the wheel *j*, will be placed in a similar position as the wheel *i*, is shown to be in at fig. 13, that is, the wheel *E*, on the

lever *y*, will be just raised out of the fall *k*, of the wheel *j*; and consequently the wheel *i*, by the four next motions of the handles, will be brought to the position it is shown to be in in that figure, that is, one motion after a divide has been effected, and the back point bar put up.

It will be seen that the sinking levers for point bars, and their upright support or tree, the treadle rods, and one of the treadles heretofore used in Lever's hand machine, are dispensed with when these improvements are applied.

The Patentee says, in conclusion, "Having now described my invention, and the manner of constructing and applying my improvements, I would have it understood that I lay no claim to the parts separately of which such combination is composed, some of the parts being well known and in use, my invention relating only to the particular combination and application to the working of a Lever's hand machine: and by this definition I mean a machine worked by hand, and by the ordinary handles affixed to the front landing bar in contradistinction to Lever's machines, which are worked by means of rotatory motion communicated by hand labour or other power. And I hereby confine my claim of invention of improvements in machinery for manufacturing bobbin net lace, first, to the combining and applying the bent lever *c*, with the bent or cranked lever *p*, and connecting them with a single treadle and with the ordinary drawing tackle above described, and also in connecting and applying the lifter *f*, and the driver *m*, with the lever *c*; and also in the application of the lever *O*, and stop *Q*, actuated by the rotation of the shaft or axle *g*, as above described. And by such application and combination of these various parts with an ordinary Lever's hand machine, I am enabled to produce the necessary movements to the machinery for effecting the last or finishing of the twisting of the carriage or bobbin

threads around the warp threads, the bringing down one of the point bars for taking up the work, the producing a dividing of the carriages as before described, all such movements being obtained to the machine by one motion of the handles on the front landing bar, the taking up of the point bar being effected by the lifter *f*, on again raising the handles of the landing bar for commencing the next or first movement of the machine, as above described.

“And, secondly, I claim the application of the safety bar X, on the pusher bars, as above described, whether in a Lever’s hand machine, or in an ordinary machine where the carriages have to be divided by the common pushers at the going down of the machine whilst the carriages are in the front or back combs.”—[*Enrolled in the Inrolment Office, June, 1833.*]

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## S U G A R R E F I N I N G.

(Continued from p. 145.)

### Fourth Series of Experiments.

The fourth set of experiments to ascertain the products of sugar refining, was made on clayed Brazil sugar, at 28s. per cwt. being the *Gazette* average price of British Colonial sugar at the time. Exactly the same apparatus and methods were employed in this as in the third set of experiments on Jamaica sugar; 2½ per cent. of animal charcoal were deemed sufficient, on account of the whiteness of the clayed sugar. No accident or false step occurred in the operations.

The following are the results:—

	Cwt.	qrs.	lbs.
Weight of sugar melted for refining	305	1	5
Transferred, in syrup and fragments, to 5th Experiment	1	—	—
Weight of sugar worked up in 4th Experiment	304	1	5
Total Extract in loaves, lumps, bastards and treacle	294	—	15
Amount of loss and refuse	—	—	10 — 18

which is equivalent to 3.74 lbs. per cwt., or 3½ per cent.

	Cwt.	qrs.	lbs.	Drawback	£	s.	d.
Extract in Double loaves	-	141	1	24 - a' 54s. p' cwt.	-	381	18 6 $\frac{1}{2}$
Single loaves	-	79	2	24 - a' 46s.	-	183	6 10
Bastards	-	29	3	27 - a' 30s.	-	45	-
Treacle	-	42	3	24			
					£610	5	4 $\frac{1}{2}$
Total Extract	-	294	-	15	Deduct 1-5th	-	122 1 0 $\frac{1}{2}$
					Total Drawback	-	488 4 4
Duty on 304 cwt. 1 qr. 5 lbs. Brazils, at 26s. per cwt.					395	11	8
Loss to the Revenue at this rate	-	-	-		£92	12	8

Cwt. qr. lbs.

141 1 24 Double loaves are equivalent to - 166.066 Single loaves.

Single loaves - - - - 79.714

Extract, reckoned in single loaves - 245.780 = 245 3 4

Hence by proportion :—

Cwt.	qrs.	lbs.	Cwt.	qrs.	lbs.	lbs.
If 304	1	5	: 245	3	4 .. 112	: 90.46 per cwt. in single loaves.
304	1	5	: 29	3	27 .. 112	: 11.06 — in bastard.
304	1	5	: 42	3	24 .. 112	: 15.80 — in treacle.

Or otherwise, in 112 lbs.—

		lbs.
Double loaves	-	-
Single loaves	-	-
Bastards	-	-
Treacle	-	-
Loss and refuse	-	-
		112.000

An import duty of 32s. 1d. per cwt. is equivalent to the above drawback.

P.S.—Since three pounds of bastards are very nearly equivalent to two pounds of single loaf sugar, the total extract, reckoned in single loaves, would be 97 lbs. and  $\frac{46}{100}$ .

#### *Fifth Series of Experiments.*

This set of experiments was made on Jamaica sugar of the *Gazette* average price, 52s. per cwt.; but it was bought in an unlucky crisis of the market, so that the remainder of the same parcel was sold for 50s. 6d., the sugar being of much the same quality as the subject of the third experiment. The apparatus and methods of treatment continued the same, except with regard to 28 cwt. of foots, which were so bad, that I had to

subject them to the operation of melting, already alluded to in detailing the results of the third experiment. No accident or false step occurred, as far as I knew, in the course of this experiment; and as the sugar, exclusive of the foots, was very similar to that of the third experiment, it will be a fair means of verification to compare the relative products of similar boilings of each.

On June 13th, 1832, 35 cwt. 1 qr. 11 lbs. of the 3d sugar were boiled into 152 Hamburg loaves, which, when brought to the scale, weighed 13 cwt. 2 qrs. 6 lbs. On December 28th, 1832, 33 cwt. 0 qr. 12 lbs. of the 5th sugar were boiled into 134 Hamburg loaves, which weighed 12 cwt. 0 qr. 27 lbs.; but by the rule of three, the latter should have weighed 12 cwt. 2 qrs. 17 lbs. in reference to the former, showing a deficiency of 46 lbs. Now 46 lbs. of refined sugar indicate or correspond to, at one boil, 120 lbs. of raw. On June 15th, 28 cwt. 3 qrs. 17 lbs. of the 3d sugar were boiled with the scum liquors of the preceding boil of the 13th, and the extract in loaves weighed 12 cwt. 1 qr. On January 4th, 1833, 33 cwt. 2 qrs. 8 lbs. of the 5th sugar with the scum liquors of the preceding boil, were converted into loaves, which weighed 12 cwt. 2 qrs. 3 lbs., whereas, by the rule of proportion, they should have weighed 14 cwt. 0 qr. 27 lbs., showing a defalcation of no less than 1 cwt. 2 qrs. 24 lbs.\* On June 27th, 1832, 22 cwt. 2 qrs. 6 lbs. of sugar of the third experiment, were boiled up along with 29 pots of Prussian and small lump green syrup, and produced 15 cwt. 3 qrs. of lump sugar; and on the 11th January, 1833, 24 cwt. 3 qrs. 8 lbs. of the 5th sugar were boiled up with 28 pots of single loaf green syrup, and produced only 14 cwt. 2 qrs. 9 lbs. Now, estimating the additional pot of syrup in the former boil to be equivalent to 64 lbs., there still remains an excess of 1 cwt. 3 qrs. 22 lbs. of sugar in the latter boil, which should have exhibited a corresponding excess in its product. That excess, at the average rate of 38 of refined loaf for 100 of raw

\* In fact, 12 cwt. 2 qrs. 3 lbs. of loaves correspond by the proportions of the 3d sugar, to 29 cwt. 3 qrs. 5 lbs. of raw sugar, instead of 33 cwt. 2 qrs. 8 lbs.; the difference is 4 cwt. !

at the first operation, would have furnished an amount of 16 cwt.

qrs., whereas only 14 cwt. 2 qrs. 9 lbs. were actually obtained, being a defalcation of nearly 2 cwt. It deserves remark, that all these boils were made by the same person, Diedrich Schlosselman; the former series within a fortnight of his commencement, after the death of Müller, while he was comparatively unacquainted with the arrangements and business of the sugar-house, and the latter after he had become familiar with every thing. When such deficiencies of weight occur on a single boiling of the fifth experiment, we can easily imagine how great the total defalcation may be. In fact, the total waste on the third experiment was only 8 cwt. 3 qrs. 2 lbs. for 199 cwt. 0 qr. 14 lbs. of raw sugar, by which proportion the waste of the fifth should have been only 13 cwt. 2 qrs. 22 lbs.; for by the rule of three, 199. 0. 14 : 8. 3. 2. :: 311. 3. 9. : 13. 2. 22. But instead of this loss, the deficiency amounts to 21 cwt. 2 qrs. 8 lbs., being about 8 cwt. unaccounted for. And if we allow 1 cwt. for loss on 28 cwt. of meltings made in the fifth experiment, a process not pursued in the third, still 7 cwt. of sugar is missing.

Such enormous waste cannot be traced to the scum, which was never sent away without undergoing a regular routine of washing and squeezing; nor can it be ascribed with any probability to ordinary motives of theft, for the Custom-house officer always saw the raw sugar well mixed with blood and water in the melting pan, before he went home in the evening, after securing the upper floors of the house with locks. The laboratory or fill-house where the copper stood with its charge of blood and sugar to be ready for the application of fire at an early hour in the morning, according to the usage of refining houses, could not be secured (unfortunately) under the Custom-house key, because the stove in the corner of the fill-house required to be looked after, and supplied with fuel, late and early. If any adequate motive were therefore applied to an ill-principled mind, abundant facilities existed, both in the evening and morning of the clearing days, for destroying a considerable quantity of the sugar left in the pan.

It is universally admitted among sugar-boilers, at home and abroad, that the more rapidly the skipping is performed, the

better is the refined sugar in colour and in grain. Prior to the commencement of the fifth experiment, the corrugated pan had received a remarkable improvement in its boiling power, of which very decided evidence is given in the quality of the products of that fifth experiment, as well as the sixth. For, while out of the unwasted and nearly similar sugar of the third experiment only 7 per cent. of loaves equal to the double standard was obtained, out of the wasted sugar of the fifth no less than 25 per cent. on the whole quantity has been got, of which only  $3\frac{1}{2}$  per cent. was from the cleansed sugar of the meltings. This important fact proves the apparatus not to be in fault in the boiling department. Nor can a drop of syrup be lost in the pan; for, supposing by any violence a hole were to be driven through the copper, the subjacent bath liquid being much denser than syrup, would prevent any part of it from descending and being lost. In this vessel assuredly there has been neither waste by accident, nor by igneous decomposition.

It is many weeks since I surmised the existence of some source of waste unknown to me; and I caused the Custom-house officer and the head boiler to fill the large syrup cistern under the filter to a measured height with water, and to note if it leaked in the course of some days. The trial was made, and it was proved to be perfectly sound and tight.

If it be said that the waste in this experiment is to be ascribed to the frequent turning over of the syrup, I answer, first, that this will not account for the great deficiency on single boils or days' work; and, secondly, I refer to the fourth experiment, where the syrups were more frequently turned over, and yet the loss on that experiment, with the same weight of sugar, was only  $3\frac{1}{2}$  per cent., while it is 7 per cent. on the fifth. About 15 tons of sugar were used for each of these experiments, and the loss on the fifth above that on the fourth is no less than 11 cwt. This difference between the results of two successive operations of an exactly similar kind, cannot be ascribed entirely to the difference of the sugars; for, if we compare the product of the first day's work of the fourth experiment on Brazil sugar with that of the first day's work of the fifth experiment, we shall find them to be nearly the same,

Thus by proportion,

(5) (5) (4) (4)

If 33. 0. 12 : 12. 0. 27 : 32. 0. 18 : 11. 3. 19. Instead of 11. 3. 19. 12. 2. 18. were actually obtained in the fourth experiment, being an excess of only 2 qrs. 27 lbs., or 83 lbs. If from this we deduct the 46 lbs. by which the first day's work of the fifth experiment fell short proportionably of that of the third, the difference becomes only 37 lbs. on a day's work of *Gazelle* average Jamaica sugar, compared to a day's work of clayed Brazil. When we proceed to boil up the syrup of the Brazil loaves, the superiority of it will become conspicuous in the quality of the loaves. Our present object, however, is merely to demonstrate product in weight; which we have clearly done, so as to leave the prodigious waste of the fifth sugar, as compared with that of the third and fourth, unaccounted for on fair principles. The second day's work of the fourth experiment cannot be introduced into the comparative estimate, because the loaves were treated with saccharine liquor instead of clay.

I may here state the great uniformity of temperature to which Schloesselman boiled his syrup. I have, on almost every occasion of a day's work, stood over the boiling pan, and noted the temperature by the thermometer to which the syrup rose, when Schloesselman found by the touch of his finger and thumb, called the proof, that the skip was ready for being discharged; and it seldom varied half a degree, being from 39° to 40° for fresh liquors, and from 43° to 44° for inferior syrups. On this precision of the proof depends the quality of the refined sugar, too low a boil leaving the loaves spongy, too high a boil making them too compact for clearing well. When three or four such skips or pan charges are worked off after each other, and well incorporated in the cooler, surprising uniformity may be secured to the product. It is one obvious advantage of the Bath pan, that the temperature of the syrup in it rises with perfect regularity, and may be deliberately observed to a fraction of a degree; whereas in boiling sugar in a pan set over a naked fire, the temperature is apt to advance by irregular starts, and especially when near the skipping point.

## Sugar Refining.

## Experiment 4.

Clayed Brazil Sugar at 28s., weight 304 cwt. 1 qr. 5 lbs. }  
duty at 24s., price - - - - - } 791 3 7

Drawback on Extracts, 1l. 12s. per cwt.  
Refinery Extracts per Sale,

Cwt. qrs. lbs.	£	s.	d.
141 1 24 Double loaves at - - -	3	10	6½
79 2 24 Single - - - - -	3	2	10
29 3 27 Bastards - - - - -	2	1	2½
42 3 24 Treacle - - - - -	1	3	0
			per cwt.
	499	9	2½
	250	12	9½
	61	16	0
	49	8	3½
			£861 6 3½
Balance in favour of Refinery - - -	70	2	8½
Add Profits from Revenue - - -	92	12	8
Total Balance to Refinery - - -	£162 15 4½		

Had the duty been 28s. the Profits would still have been  
46l. 6s. 4d. at the expense of the Revenue, besides the Re-  
finery Profits.

## Experiment 5.

Jamaica Sugar at 28s., duty 24s., weight 311 cwt. 3 qrs. }  
9 lbs., price, duty included - - - - - } 810 15 2

Drawback payable on Extracts, 29s. per cwt.  
Refinery Extracts per Sale,

Cwt. qrs. lbs.	£	s.	d.
78 1 15 Double loaves at - - -	3	11	0
124 0 23 Single - - - - -	3	4	0
46 1 5 Bastards - - - - -	2	3	0
41 1 14 Treacle - - - - -	1	3	0
			per cwt.
	278	5	8
	397	9	5
	99	10	9
	47	11	6
			£822 17 4
Balance in favour of Refinery - - -	12	2	2
Add Profits from Revenue - - -	88	4	8
Total Balance for Refiner - - -	£100 6 10		

But the value of 7 cwt. of Sugar wasted should be added,  
equivalent to about 18l. 4s.

## Experiment 6.

Montserrat Sugar at 29s., weight 307 cwt. 7 lbs., price, duty }  
included - - - - - } 815 2 9½

Drawback payable on Extracts, 30s. per cwt.  
Refinery Extracts per Sale,

Cwt. qrs. lbs.	£	s.	d.
113 1 20 Double loaves at - - -	3	11	0
98 3 19 Single - - - - -	3	4	0
28 0 26 Bastards - - - - -	2	3	0
40 1 1 Treacle - - - - -	1	3	0
			per cwt.
	402	13	6
	316	10	10
	60	14	3½
	46	6	0
			£826 4 4½
Balance in favour of Refinery - - -	11	1	7½
Add Profits from Revenue - - -	92	8	9
Total Balance in faveur of Refiner	£103 10 4½		

To this sum should be added the value of 9 cwt. of Sugar wasted, 23l. 17s.

(Signed)

ANDREW URE.

{ -- 61 of these loaves used for bot-  
toning, and remaining 84 weighed  
-- Cwt. 3 qrs. 15 lbs.  
- Only 2 remaining, the rest  
broken up into cask and subse-  
quently used.  
} the single and Hamber loaves  
broken up and used; 1 qr. 14 lbs. of  
the remainder entitled to double  
bounty.

Broken up into cask. See below.

Taken into pan, March 15.  
Taken into pan and boiled Mar. 22.  
Taken into pan, March 28.

Bastards. See below.

- Reboiled and made into 25  
Prussian jumps. April 13, and 1  
lump used to bottom up remainder.

See below (Bastards.)

of which  $\left\{ \begin{array}{l} 19 \ 3 \ 1 \\ 68 \ 2 \ 24 \end{array} \right\}$  is entitled to double bounty do. single do.

**List of Patents**

*Granted in Scotland from May, 1833, to March, 1834.*

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To Thomas Howard, of Copthall-court, in the city of London, merchant, for an invention of improvements on his invention, denominated the vapour engine, and the application of a part or parts thereof, with certain additions and improvements on steam engines.—Sealed 24th June.

- John Hornby Maw, of Aldermanbury, in the city of London, surgical instrument maker, for the invention of an improved apparatus for injecting enemata.—Sealed 17th July.
- William Henson, of the city of Worcester, lace manufacturer, for an invention of certain improvements in machinery for manufacturing bobbin net lace.—Sealed 30th July.
- John Scott Russell, M.A., of No. 8, Stafford-street, Edinburgh, for an invention of certain improvements in the construction of vessels for sustaining the pressure of fluids, and in the boilers and machinery of steam engines, and in the manner of their application to locomotive purposes.—Sealed 2d August.
- Thomas Wrigley, of Bridge-hall mills, near Bury, in the county of Lancaster, paper maker, for an invention of an improved pulp strainer, to be used in making paper.—Sealed 27th August.
- William Henry James, of Birmingham, civil engineer, for an invention of certain improvements on the construction of steam carriages, and the apparatus for propelling the same, a part of which improvements is applicable to other purposes.—Sealed 27th August.
- To George Beale Brown, of New Broad-street, in the city of London, merchant, for an invention, in consequence of a communication made to him by a foreigner residing abroad, of certain improvements in machinery for making or manufac-

turing pins of the kind which are commonly used for fastening wearing apparel.—Sealed 27th August.

To William Henry Barnard, of No. 26, New Broad-street, in the city of London, gentleman, for an invention of a solvent not hitherto used in the arts.—Sealed 21st September.

— James Jones, of Salford, in the county of Lancaster, machine maker, for an invention of certain improvements in the making of rovings, spinning and doubling cotton, silk, flax, and other fibrous substances—Sealed 21st September.

— John Ericsson, of Albany-street, Regent's-park, in the county of Middlesex, civil engineer, for an invention of an engine for producing motive power, whereby a greater quantity of power is obtained from a given quantity of fuel than heretofore.—Sealed 22d September.

— John Robertson, of Crofthead, in the parish of Neilston, and county of Renfrew, cotton spinner, for an invention of certain improvements in the mule, jenny, or other machine for spinning of cotton, and in the billy, stretching frame, or other machine for roving of cotton, and in the machinery for spinning and roving of silk, wool, flax, hemp, or other fibrous substances.—Sealed 23d September.

— John Paterson Reid, of the city of Glasgow, merchant and power loom manufacturer, and Thomas Johnson, of the said city of Glasgow, mechanic, in the employment of John and Archibald Reid, of the said city of Glasgow, power loom manufacturers, for an invention of certain improvements applicable to certain looms for weaving different sorts of cloth.—Sealed 9th October.

— Henry Ewbank, of Idol-lane, in the city of London, merchant, for an invention of an improved process to be used in dressing of paddy or rough rice, invented by him in conjunction with his late partner Jonathan Lucas, deceased.—Sealed 10th October.

— William Wilkinson Taylor, of Bow, in the county of Middlesex, felt manufacturer, for an invention of an improved cloth for the sails of ships and other vessels.—Sealed 14th October.

To Charles Terry, of Shoe-lane, in the city of London, merchant, and William Parker, of New Gravel-lane, Shadwell, in the county of Middlesex, merchant, for an invention of improvements in making and in refining sugar.—Sealed 7th November.

— Charles Attwood, of Whickham, near Gateshead, in the county of Durham, glass manufacturer, for an invention of a certain improvement or improvements in manufacturing or purifying soda.—Sealed 25th November.

— Herman Hendricks, of Dunkirk, in the kingdom of France, but now of the Strand, in the county of Middlesex, gentleman, in consequence of a communication made to him by a foreigner resident abroad, for an invention of improvements in manufacturing prussiate of potash, and the prussiate of soda, and improvements in dyeing blue colours without indigo.—Sealed 25th November.

— Charles Joseph Hullmandell, of Great Marlborough-street, in the county of Middlesex, printer, for an invention of a certain improvement in the art of block printing, as applied to calico and some other fabrics.—Sealed 26th November.

— George Frederick Muntz, of Birmingham, in the county of Warwick, roller of metals, for an invention of an improved manufacture of boilers used for the purpose of generating steam.—Sealed 26th November.

— John Tennant, merchant, and Thomas Clark, chemist, both of Glasgow, in the county of Lanark, for an invention of new or improved apparatus to produce or evolve chlorine for manufacturing purposes.—Sealed 12th December.

— John Babtist Constantin Torassa, of Newington-causeway, in the county of Surrey, gentleman, Paul Isaac Murton, of Austin-friars, in the city of London, merchant, and Henry Walker Wood, of the same place, merchant, in consequence of a communication made to them from Mr. Emanuel Montebruno, of Genoa, for an invention of certain improvements in making or producing the pigment commonly known by the name of white lead, or carbonate of lead.—Sealed 27th December.

To Bartholomew Richard Compte de Predeval, of Leicester-place, Leicester-square, in the county of Middlesex, engineer, for an invention of an engine for producing motive power, applicable to various purposes.—Sealed 27th December.

— William Godfrey Kneller, of Mitcham, in the county of Surrey, chemist, for an invention of certain improvements in evaporation.—Sealed 27th December.

— Mark Cosnaham, of the Isle of Man, Esq., for an invention of certain improvements in apparatus, modes, or processes, for converting sea water or salt water (and also other brackish, turbid, or impure waters) into purified or fresh water, which apparatus, modes, or processes, or part thereof, may be applied to other purposes.—Sealed 27th December.

— Miles Berry, of Chancery-lane, in the parish of St. Andrew, Holborn, in the county of Middlesex, mechanical draftsman, in consequence of a communication from a foreigner residing abroad, for an invention of an improved apparatus for boiling, evaporating, and concentrating syrups for the production of sugar, and also of saline liquors, or for the crystallisation of salt, which apparatus may also be employed in the process of distillation.—Sealed 10th January.

— John Joyce, of Sidmouth-street, Gray's Inn-road, in the parish of St. Pancras, in the county of Middlesex, gentleman, in consequence of a communication made to him by a foreigner residing abroad, for an invention of a certain improvement or certain improvements on machinery for making nails of iron, copper, and other metals.—Sealed 10th January.

— David Rowland, of 68, Crawford-street, in the parish of St. Marylebone, in the county of Middlesex, mechanic, for an invention of an improvement in the manufacture of sextants, quadrants, circles, and other instruments used in taking observations and surveys.—Sealed 15th January.

— John Squire, of Paddington-basin, engineer, and Francis Macerone, of Upper George-street, Bryanstone-square, Esq., both in the county of Middlesex, for an invention of certain

improvements in boilers for generating steam.—Sealed 23d January.

To Robert Beart, of Godmanchester, in the county of Huntingdon, miller, for an invention of certain improvements in making or producing tiles for draining land, building, and other purposes.—Sealed 23d January.

— William Rodger, of Norfolk-street, Strand, in the county of Middlesex, lieutenant R. N., for an invention of a certain improvement or improvements in anchors.—Sealed 3d February.

— Henry Davey, of the parish of St. Giles, Camberwell, in the county of Surrey, gentleman, in consequence of a communication made to him by a foreigner residing abroad, for an invention of certain improvements in machinery or apparatus for preparing linen and cotton rags, and other materials used in the manufacture of paper.—Sealed 10th February.

— Ernst Wolff, late of Leeds, in the county of York, but now of Stamford-hill, in the county of Middlesex, gentleman, in consequence of a communication made to him by a foreigner residing abroad, for an invention of certain improved means of supplying heated air in order to support combustion in enclosed fire places.—Sealed 11th March.

— Thomas Wetch, of Manchester, in the county of Lancaster, for an invention of a new method of taking up for power and hand looms.—Sealed 12th March.

— James Smith, of Deanston, in the parish of Kilmadock, in the county of Perth, cotton spinner, for an invention of certain improvements in machinery used in the preparing and spinning of cotton, flax, wool, and other fibrous substances.—Sealed 19th March.

— James Smith, of Deanston, in the parish of Kilmadock, in the county of Perth, cotton spinner, for an invention of certain improvements in machinery for carding cotton, flax, wool, silk, and other fibrous substances.—Sealed 19th March.

## NOVEL INVENTION.

## DOCTOR CHURCH'S STEAM-CARRIAGE.

THIS long projected invention has at length arrived at something like maturity. The carriage, which is fitted up with considerable taste and elegance, was launched for the first time on the public road in the evening of Friday, the 25th ult. Its machinery had never before that evening in a connected form been actuated by the power of steam; and its performance was such as to produce a more promising expectation of realising the problem of steam propulsion on ordinary roads, than any other effect of the sort that we have heretofore seen.

Our present limits will not allow us to give a detailed account of the machine, but we shall endeavour to do so in our next, accompanied with the specification of the last improvements, which have been adapted in the construction of the boiler, and which have tended very materially to the accomplishment of a perfectly safe and effective locomotive machine.

The boilers, engines, and their appendages, are all enclosed within a square compartment of about eight feet high and long, and five feet wide, which forms the central part before and behind, to which are attached capacious coach bodies corresponding in appearance, and capable of holding ten persons in each; and connected to these are open cabriolets affording accommodation for eight persons more, making twenty-eight inside passengers. Below are receptacles for luggage, and on the roof accommodation for thirty persons, exclusive of the conductor and guard.

Little is to be expected from a first attempt, but we have much pleasure in saying that a more successful result could not have been anticipated.

After passing heavily laden from the manufactory at Bordesley-green, near Birmingham, through several green lanes recently laid with loose gravel, and performing several acute and difficult turns in the road, this ponderous vehicle proceeded along the Coventry-road with at least fifty persons upon it, at a rate of more than twenty miles per hour for some distance (perhaps near a mile); but as it was not designed to carry this experiment further than a mere trial of the capabilities of the machinery, and the means

for prolonging the journey not having been provided, we are not in a situation to state such particulars at present as would, perhaps, be necessary to satisfy the inquiries of a practical engineer; but hope to be enabled in our next to give a more detailed account of the performance and construction of the machine, which certainly comprehends several features of considerable novelty and ingenuity, and unquestionably reflects very great credit both upon the ability and perseverance of its talented projector.

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**New Patents**

**SE A L E D I N E N G L A N D,**

1834.

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To Janet Taylor, of East-street, Red Lion-square, in the county of Middlesex, for her invention of improvements in instruments for measuring angles and distances, applicable to nautical and other purposes.—Sealed 27th March—6 months for enrolment.

To Henry William Nunn, of Whippingham, in the Isle of Wight, bobbin net lace manufacturer, for his invention of improvements in manufacturing certain kinds of embroidered lace.—Sealed 27th March—6 months for enrolment.

To James Walton, of Sowerby Bridge, in the county of York, cloth dresser, for his invention of improvements in cards for carding wool, cotton, silk, and other fibrous substances, and for raising the pile of woollen and other cloths.—Sealed 27th March—6 months for enrolment.

To John Cooper Douglas, of Great Ormond-street, in the county of Middlesex, Esq., for his invention of a method of constructing an apparatus or apparatuses from which a motive principle of power is obtained, likewise for increasing said motive principle, applicable to various denominations of locomotion, and to machinery that is stationary, and also for raising solid and fluid bodies, and various other useful purposes, and also for constructing and forming of apparatus and vehicles to be propelled or

worked by means of the said power.—Sealed 29th March  
—6 months for inrolment.

To William Hirst, of Leeds, in the county of York, clothier, for his invention of certain improvements in machinery for the better dressing and finishing woollen and other fabrics.—Sealed 31st March—6 months for inrolment. *21st Mar.*

To Hooton Deverill, of Manchester, in the county of Lancaster, gentleman, for his invention of a method of engraving and etching on cylindrical surfaces for printing and other purposes.—Sealed 31st March—6 months for inrolment.

To George Millichap, of Birmingham, carriage axle-tree manufacturer, for his invention of certain improvements on locomotive machines or carriages.—Sealed 31st March—6 months for inrolment.

To Herman Hendriks, of the Strand, in the county of Middlesex, gentleman, for an invention of improvements in the process of dyeing wool and woollen fabrics yellow, being a communication from a foreigner residing abroad.—Sealed 8th April—6 months for inrolment.

To Henry Crosley, of Hooper-square, Leman-street, in the city of London, engineer, for his invention of an improved method or process, arrangement and combination of apparatus with certain agents used or employed therewith, whereby evaporation of fluids and solutions may be effected advantageously, and also for other beneficial purposes to which the said method or process is applicable or can be applied.—Sealed 8th April—6 months for inrolment. *8 Oct.*

To Auguste Victor Joseph d'Asda, of Adam-street, Adelphi, in the county of Middlesex, gentleman, for an invention of certain improvements on pumps or machinery for raising water and other fluids, being a communication from a foreigner residing abroad.—Sealed 10th April—6 months for inrolment. *(2)*

To Samuel Morand, of Manchester, in the county of Lancaster, merchant, for his invention of improvements on his improved sketching machine, for which he obtained Letters Patent the 14th day of April, 1831.—Sealed 12th April—6 months for inrolment. *12 Oct.*

To John Beare, of Pall-mall East, in the county of Middlesex, civil engineer, for his invention of certain improvements in engines or machines for raising or conveying water or other fluids.—Sealed 12th April—6 months for enrolment.

To William Williams, of Pembrey House, near Llanelly, and Thomas Hay, of Kidwelly tin-works, both in the county of Carmarthen, gentlemen, for their invention of improvements in preparing certain metals applicable to the sheathing the bottoms of ships, and other purposes.—Sealed 17th April—6 months for enrolment.

To John Henry Cassell, of Mill-wall, Poplar, in the county of Middlesex, merchant, for his invention of a cement or combination of materials applicable to the purposes for which cement, stone, brick, or other similar substances, may or can be used.—Sealed 19th April—6 months for enrolment.

To John Hewitt, of Kenegie, Cornwall, gentleman, for his invention of a combination of certain materials or matters which, being combined or mixed together, will form a valuable substance or compound, and may be used with or as substitute for soap.—Sealed 19th April—6 months for enrolment.

To Juan José Segundo, of Burton-crescent, in the county of Middlesex, Esq., for his invention of an apparatus or method applicable to side saddles for giving the security to persons when riding.—Sealed 22d April—6 months for enrolment.

To Joseph Shee, of Lawrence, Pountney-place, in the city of London, gentleman, for his invention of certain improvements in distillation.—Sealed 22d April—6 months for enrolment.

To John Bethell, of Mecklenburgh-square, in the parish of St. Pancras and county of Middlesex, gentleman, for his invention of certain improvements in machinery or apparatus for making metal screws, pins, bolts, and rivets.—Sealed 24th April—6 months for enrolment.

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## CELESTIAL PHENOMENA, FOR MAY, 1834.

D.	H.	M.	D.	H.	M.
1			18	11	58
			h	in conj. with the ♃	diff. of
10	9			dec. 2.	49. 8.
			19	Occul.	65 Virginis im. 13 h.
				54 m.	
16	8		20	Clock after the ☽	3m. 49s.
3	22	9		☽ passes the mer.	10 h. 11 m.
				2	☽ in perigee.
4	7	☽ in apogee.	22	11	2
5		Clock after the ☽ 3m. 30s.	Ecliptic oppo. or ☽ full moon.		
		☽ passes the mer. 22 h. 20 m.	Occul. γ in Scorpil im. 12 h.		
6	2	24 ♀ in conj. with the ♃ diff. of		26 m.	
		dec. 1. 59. N.	23	18	46 ♀ in conj. with ♍ diff. of
8		Mer. R. A. 1 h. 33 m. dec.	dec. 0. 4. S.		
		6. 43. N.	24	Mer.	R. A. 3 h. 21 m. dec.
		— Ven. R. A. 4 h. 4 m. dec.	17. 33. N.		
		21. 3. N.	— Ven. R. A. 5 h. 28 m. dec.		
		— Mars R. A. 24 h. 0 m. dec.	24. 10. N.		
		1. 32. S.	— Mars R. A. 0 h. 44 m. dec.		
		— Vesta R. A. 1 h. 26 m. dec.	3. 17. S		
		3. 24. N.	— Vesta R. A. 1 h. 53 m. dec.		
		— Juno R. A. 19 h. 57 m. dec.	5. 47. N.		
		6. 1. S.	— Juno R. A. 20 h. 0 m. dec.		
		— Pallas R. A. 9 h. 18 m. dec.	4. 54. S		
		10. 11. N.	— Pallas R. A. 9 h. 41 m. dec.		
		— Ceres R. A. 10 h. 5 m. dec.	11. 54. N.		
		24. 48. N.	— Ceres R. A. 10 h. 19 m. dec.		
		— Jup. R. A. 3 h. 4 m. dec.	22. 30. N.		
		16. 27. N.	— Jup. R. A. 3 h. 19 m. dec.		
		— Sat. R. A. 12 h. 21 m. dec.	17. 29. N.		
		0. 33. N.	— Sat. R. A. 12 h. 19 m. dec.		
		— Georg. R. A. 21 h. 56 m. dec.	0. 43 N.		
		13. 25. S.	— Georg. R. A. 21 h. 56 m. dec.		
		— ♀ passes the mer. 22h. 31m.	13. 22. S.		
		— ♀ passes the mer. 1 h. 0 m.	— ♀ passes the mer. 23h. 18m.		
		— ♀ passes the mer. 20 h. 55 m.	— ♀ passes the mer. 1h. 21m.		
		— ♀ passes the mer. noon.	— ♀ passes the mer. 20h. 37m.		
8	8	♀ in conj. with the ♃ diff. of	— ♀ passes the mer. 23h. 9m.		
		dec. 2. 33. N.	Clock after the ☽ 3m. 28s.		
		25 Ecliptic conj. or ☽ new moon.	☽ passes the mer. 14h. 54 m.		
9	3	5 ♀ in conj. with the ☽	— Occul. χ <sup>1</sup> Capri im. 12 h. 29 m.		
			em. 18h. 45m.		
17	32	♀ in conj. with the ♃ diff. of dec. 2. 20. N.	27	H	in conj. with the ♃ diff. of
		19 20 ♀ greatest hel. lat. S.	dec. 3. 59. N.		
10		Clock after the ☽ 3 m. 50 s.	49 ♀ in ascending node.		
		— ♀ passes the mer. 1 h. 18 m.	29 20 54 ♀ in ☐ or last quarter.		
15	19	54 ♀ in ☐ or first quarter	31 18 38 ♀ stationary.		
		17 11 H in quadrature with the ☽	23 ♀ in apogee.		
		12 ♀ in conj. with via Texri, diff. of dec. 1. 53. S.	The Eclipses of Jupiter's satellites are not visible this month, Jupiter being too near the Sun.		
18	10	24 ♀ in perihelion.			

M E T E O R O L O G I C A L ] J O U R N A L ,  
 FOR MARCH AND APRIL, 1834.

1834.	Thermo.		Barometer.		Rain in in- ches.	1834.	Thermo.		Barometer.		Rain in in- ches.
	Hig.	Low.	Hig.	Low.			Hig.	Low.	Hig.	Low.	
March						April.					
26	45	24	29,99	29,90		11	47	26	30,14	30,02	
27	57	33	29,80	29,71	,025	12	44	30	29,93	29,88	
28	49	38	29,63	29,58	,025	13	47	33	29,99	29,90	,05
29	58	39	29,66	29,56	,05	14	51	24	30,19	30,07	
30	49	31	29,86	29,74		15	53	27	30,33	30,27	
31	48	30	29,99	29,93		16	55	29	30,39	30,37	
April.						17	57	33	30,44	30,40	
1	49	33	29,98	29,91		18	59	35	30,40	30,37	
2	53	40	30,09	30,01	,075	19	51	39	30,34	30,29	
3	55	45	30,24	30,17	,4	20	55	31	30,23	30,18	
4	55	40	30,46	30,44		21	58	34	30,14	30,11	
5	57	38	30,40	30,33		22	60	39	30,09	30,08	
6	58	30	30,20	30,17		23	53	35	30,16	30,11	
7	57	26	30,24	30,23		24	55	32	30,25	30,24	
8	51	34	30,16	30,11		25	59	31	30,19	30,12	
9	54	37	30,18	30,10							
10	47	27	30,24	30,21							

Edmonton.

CHARLES HENRY ADAMS.

Latitude 51° 37' 32" N.

Longitude 3° 51' West of Greenwich,

THE  
**London**  
**JOURNAL OF ARTS AND SCIENCES,**  
AND  
**REPERTORY**  
OF  
**PATENT INVENTIONS.**

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*CONJOINED SERIES.*

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No. XXVI.

**Recent Patents.**



*To PETER EWART, of Manchester, in the county of Lancaster, cotton spinner, for a certain improvement or improvements in the spinning machine called the mule.—*  
[Sealed 9th November, 1833.]

My invention consists in certain arrangements of machinery, by means of which I effect certain movements in the spinning machine called the mule, some of which have been heretofore in the ordinary machine performed by hand.

The causing of these movements to become dependent on the moving power which drives the machine, and not on the skill of the operative or spinner, is called the making

the machine self-acting ; and in the manner in which my invention for this purpose is to be performed and carried into effect will be more clearly seen by reference to the annexed drawings, in all which various views and sections of machinery letters and figures of reference are used ; the same letters and figures of reference denoting the same parts throughout the whole of the drawings. But before I commence the description of the annexed drawings, I shall briefly state the action or various movements of the machine called the mule, to render the subsequent description of the drawings more clear.

The spinning action, or the putting of twist into yarn or thread manufactured on the machine called the mule, commences (as is well known to spinners and persons conversant with spinning machinery) at the same time as the rotation of the front or delivering roller, and continues during the travelling out of the carriage, or what is called the stretch or stops, shortly after the carriage has arrived at its greatest distance from the front or delivering roller. As soon as the spinning or twisting action of the spindles ceases, it is the duty of the spinner to reverse the rotation of the spindles so as to unwind, or, as is commonly called, back off the few spiral coils of yarn which arrange themselves on the bare part of the spindles during the operation of spinning or putting in of the twist, (see Plate X, *a, a, a, a*, figs. 7, 8, and 9,) at the same time that he depresses or puts down the faller wire for the purpose of guiding the yarn to the lower part of the spindles, where it is subsequently wound on as hereinafter explained.

These coils being backed off, and the faller wire being put down, the spinner immediately runs in, or puts up the carriage, at the same time winding on to the spindles the length or amount of yarn which has been spun or perfected during the last stretch or coming out of the carriage,

which yarn is guided by the gradual elevation of the faller wire.

In mules of the ordinary construction these four movements, namely, the "backing off," the "putting down and guiding the faller wire," the "putting up of the carriage," and "winding on of the yarn," depend on the attention and skill of the spinner; the remaining movements, namely, the coming out of the carriage, and the spinning or twisting of the yarn or thread, being dependent on the machine itself, and being well known to spinners and persons conversant with spinning machinery, and no part of my invention, I shall not describe.

Now the object of my invention being to make the machine called the mule perform the whole of the movements above named, independent of the spinner, at the various periods of time when they are required for the proper action of the machine, I shall proceed to describe the manner in which my certain improvements are carried into effect by reference to the annexed drawing, see Plate X.

Fig. 1, A, represents a sectional elevation of the drawing rollers, together with part of an ordinary mule, some parts being omitted for the purpose of showing more clearly the construction and arrangement of my improvements. In this figure the carriage, which is in dotted outline, is seen at the end of a stretch or greatest distance from the drawing rollers, and in the position when the backing off of the spiral coils, represented on an enlarged scale at *a, a, a, a*, figs. 7, 8, and 9, is required to be performed. This movement I effect in the following manner:—B, represents a face plate, the upper surface of which is covered with leather, and fastened on the upright shaft C 1, as also seen in fig. 10, which represents a side elevation of this part of my invention. Above the face plate B, and loose on the same shaft, is another face plate C, the under surface

of which is covered with leather; this is held free of the face plate B, by means of the levers b, which is held stationary by the catch b 1, which holds on the perpendicular part b 2, as best seen in fig. 10, under the face plate B; and on the same shaft is fixed the pulley D, round which the drum band c, c, passes, and imparts to it motion, indicated by the arrow seen in plan, fig. 2, carrying the shaft C 1, and face plate B, in the same direction. E, is a sector vibrating on its centre, and connected to the smaller diameter of the face plate C, by the strap e, and held in the position shown in the drawing by a weight F, suspended in any convenient position from a small arm or lever fixed on the shaft F 1, which is connected with shaft E 1, on which the sector E, is placed by means of the perpendicular rod E 2, and arm E 3, as seen in figs. 1 and 2; and this strap e, is held in a state of tension by the band and counter weight T, see fig. 10.

As soon as the carriage has arrived at the end of a stretch, and the driving strap is traversed in the ordinary manner from the fast to the loose pulley on the rim shaft for the purpose of stopping the spinning action of the spindles, the carriage comes in contact, and presses against the horizontal rod G, which, being connected with the catch b 1, liberates the face plate C, which is immediately pressed on the face of B, by means of a small lever d, and d 1, and partakes of the motion of B, which still continues; the driving strap is traversed from the fast to the loose pulley of the rim shaft, in consequence of the inertia which the rim has acquired during the spinning. This inertia of the rim carrying round the face plate C, along with the face plate B, which is now pressed to its surface, vibrates the sector E, in the direction shown by the arrow in fig. 2, to the extent it is allowed to vibrate in that direction; and when it is stopped it holds fast the face plate C,

and the friction between the two surfaces of C and B, stops the rotation of the rim.

As soon as the rim is stopped, the weight F, again vibrates the sector E, into its former position, and carrying back the strap e, reverses the motion of the face plates C and B, and the pulley D, and thereby the direction of the drum band which produces the reverse rotations of the spindles or breaking-off motion which was required in addition to the friction between the face plates C and B, caused by the weight d 1. I place a small projection on the upper surface of C, which comes under a spring at one part of the revolution, and thereby increases the friction.

The amount of the reverse rotation of the pulley D, or backing off, must necessarily decrease as the cop increases, as will be seen by reference to figs. 7, 8, and 9, where the amount of spiral coils a, a, a, a, to be unwound or backed off, are shown less in number as the cop of yarn increases in size ; and this required decrease is provided for by the position of the inclined plane H, on which the rest or stop h, which determines the vibration of the sector E, is supported ; and the position of the sector E, will be seen in dotted lines in fig. 1, where the stop h, is resting on the inclined plane H.

The inclined plane H, is held in the position shown in the drawing by a slot or guide h 1, see fig. 2, and is connected to the part I, as also shown in figs. 1 and 2. The part I, is supported on small rods i, i, at each extremity, and is moved endwise in the direction of the arrow by means of a screw and ratchet wheel with a gathering catch, as best seen at K, in plan at fig. 2. In this arrangement the carriage comes in contact with the lever K, when it goes, so that every traverse or stretch of the carriage gathers a tooth of the ratchet, and by means of the screw at K, moves the part I, and inclined plane H, a small

degree further to the position shown in the dotted lines in the drawing at fig. 1, which bringing the stop *h*, in contact with a more elevated part of the inclined plane *H*, arrests the vibration of the sector *E*, sooner, and thereby terminates or decreases the backing off. At the commencement of a set of cops this inclined plane *H*, is placed in the position shown in the drawing, and every successive traverse of the carriage moves it nearer the position shown in dotted lines, at which position it arrives at the termination or finish of the cop.

Simultaneously with the backing-off motion already described, the putting down and guiding the faller is required to take place; and this movement depends on the vibration of the sector *E*, on referring to the dotted lines which represent the carriage in fig. 1 *L*, represents a small lever connected to the shaft, which carries the faller wire, the extremity of which is connected with the perpendicular rod *L* 1. As soon as the carriage arrives at the end of a stretch or greater distance from the front rollers, as seen in fig. 1, and while the sector *E*, is vibrated in the direction of the face plates *C* and *B*, the perpendicular rod *L* 1, comes over a lever *L* 2, which, being supported on the arm or projection *l*, partakes of the vibration of the sector *E*, and is at that moment depressed; but returning to the position, shown in the drawing, elevates the rod *L* 1, and depresses the faller wire, so that when the sector *E*, returns to its former position by the action of the weight *F*, which backs off, the same motion puts down the faller to the point required, and the amount of depression progressively decreases by the same train of movements as govern the vibration of sector *E*, for decreasing the backing off already described, the necessity of which decrease will be hereafter explained. The guiding or progressive elevation of the faller which is required to distribute the

yarns on the various diameters of the cop during the going in of the carriage, is effected by means of the long inclined plane  $M, M$ , called a coppering rail, on which the end or lower extremity of the rod  $L 1$ , rests, after it has been elevated by the return vibration of the sector  $E$ , as already described.

The descent of this inclined plane  $M, M$ , towards the front rollers, allows the faller wire to rise gradually; and at its termination, when the carriage has arrived near the front rollers, the end of the rod  $L 1$ , being no longer supported by the inclined  $M, M$ , elevates the faller clear of the spindles preparatory to the recommencement of spinning in the succeeding stretch: the adjustment for carrying the exact elevation of the inclined plane  $M, M$ , and the necessity of such adjustment, will be seen hereafter, when the construction and nature of a cop has been explained.

The backing off and the putting down of the faller being effected, the carriage is taken in or up to the front rollers by means of the band  $N$ , which is fast to the carriage, and is brought into action also by the return vibration of the sector  $E$ . At the same time that the faller is put down by the elevation of the lever  $r$ , a small arm marked  $m$ , in figs. 1 and 2, is elevated, which action on the train of levers  $m 1, m 2$ , and  $m 3$ , vibrates the small projection  $m 4$ , in which the large lever  $m 5$ , hath hitherto been supported; the lever  $m 5$ , elevating one arm of the bell crank;  $m 6$ , traverses the long rod  $m 7$ , to the position seen in fig. 1, and carrying the vibratory lever  $m 8$ , which had up to that period supported the lever  $m 9$ , allows the upright rod  $m 10$ , to traverse a driving strap on to the fast pulley on the shaft which carries the taking scroll  $N 1$ , to which the band  $N$ , is attached; and as soon as the carriage has arrived at the front rollers, it elevates the lever  $m 9$ , which

again traverses the driving strap on to the loose pulley, and terminates the taking in action of the band N. A small spring pressing on the lower arm of m 8, holds the lever m 9, stationary, until the carriage is again at the end of a stretch, and the action of this movement is recommenced.

It will be observed that the coming in of the carriage again puts up the lever m 5, to be supported on the projection m 4, which has always a tendency to remain perpendicular by the action of a small sprig m 11, seen in plan, fig. 2; and also that, when the carriage arrives at the front rollers, the rod m 7, is put back, or placed in its former position by the carriage pressing against the lever O, which is fixed on the same shaft as O 1, which acts on the rod m 7. This same vibration of the shaft O 2, puts the mendoza band in action; but this being a part of all ordinary mules, and no part of my invention, needs no further description here.

The winding on of the yarn to form the cop must proceed at the same time as the going in of the carriage; but before I commence the description of the means by which I effect this movement, I shall give a short description of the nature and construction of a cop, together with some further observations on the putting down and guiding the faller wire, to render the object and necessity of the various arrangements for effecting the winding-on movement better understood. A cop of yarn, which in this machine is built on the bare spindle, consists of a succession of thicknesses or layers of yarn, one of which is placed on the surface of the cop at each going in or putting up of the carriage, such thickness or layer being the amount of yarn which has been spun during the preceding stretch or coming out of the carriage. The length of the stretch being uniformly the same, and consequently the amount of yarn to be wound on the same, it is clear

that the number of revolutions of the spindle required to wind on the first stretch when the spindles are bare, must be much greater than when the yarn has accumulated on the spindle, and the circumference thereby considerably increased ; the necessity of this variation of the speed of the winding-on motion is not very perceptible at the commencement of a set of cops ; but as soon as the yarn on the spindle assumes the form represented at fig. 7, Plate X., the winding on which always commences at the greatest circumference of the cop, will require to be slower at the first part of the going in of the carriage, and quicker as the faller wire rises, until the carriage arrives at the front rollers, at which period the yarn is winding on the bare spindle, which requires the quickest speed.

The proportion which the speed of the spindle at the commencement of going in, bears to the speed which is required when the carriage has arrived at the front rollers, will vary every stretch until the cop has assumed the form of a double cone, as represented at fig. 8, Plate X., which is the greatest circumference of the cop, and is called the cop bottom. After the cop bottom is formed, as represented at fig. 8, Plate X., the remainder of the cop consists of a succession of conical layers similar in every respect, as indicated by the faint oblique lines in fig. 9, which represents a finished cop.

After what has been said of the construction of a cop, and bearing in mind that the winding on of the yarn always commences at the base of the cone, or greatest circumference of the cop, and that the regular distribution of the yarn on the cop depends on the position of the faller wire, it will be clear that the putting down of the faller wire must decrease every going in to allow for the increasing size of the cop, and more elevated position on which the cone or layer of yarn has to be placed. This

decrease of the depression of the faller wire is effected by the varying vibration of the sector E, as already described in speaking of the movement for putting down the faller. But the position of the inclined plane M, M, for guiding the faller, as already explained, must also vary as the cop increases; and this is effected by the same screw movement which varies the position of the small inclined plane H, for governing the vibration of the sector E, to decrease the backing-off movement.

On referring to figs. 1 and 2, it will be seen that the coppering rail or inclined plane M, M, is held by and moves freely on two upright pins or rods p, p, and is supported on two inclined planes p 1, p 1, similar to the inclined plane H, but placed in the reverse position. The two inclined planes p 1, p 1, which support and govern the elevation of the coppering rail M, M, are attached to the same part I, as the inclined plane H, and partake of the same motion emanating from the screw and ratchet K, already described. Thus at the same time as the inclined plane H, advances at every stretch of the carriage, and thereby arrests the vibration of the sector E, to lessen the backing off sooner, the inclined planes p 1, p 1, recede, and thereby gradually depresses the coppering rail M, M, to lessen the fall of the faller wire at every succeeding winding on.

I shall now proceed to describe the winding on, which constitutes the last and most important movement of the machine. In fig. 1, Plate X., P, represents a cone supported in a vibrating carriage or framing, and driven by the strap P 1, which passes over a small warve or pulley P 2, fixed on the shaft which carries the cone P, as best seen in fig. 3, Plate X. This driving band P, is driven from the pulley P 3, which receives motion by the driving strap P 4, as seen in fig. 1. P 5, represents a fast pulley, on the further side of which is placed a loose pulley of the

same diameter, to which the strap P 4, is traversed by the guider m 10, which moves when the carriage arrives at the front rollers. But when the carriage commences going in, and the winding on is also required to commence, the driving strap P 4, is traversed into the fast pulley P 5, by the vibration of F 1, which liberates a catch P 6, and allows the strap guider P 7, to carry the strap on to the fast pulley P 5, where it is forced by the weight P 8. The cone P, being thus put in motion a little prior to the inward motion of the carriage, the winding on is ready to commence. Fig. 3, Plate X., represents the cone P, and the arrangement of parts for effecting the winding-on movement, as seen from the front or drawing roller of the mule, in which view the cone P, will be seen to rest upon a similar cone Q, placed in the reverse position.

The shaft Q 4, on which this cone is placed, is geared by bevel wheel to the upright shaft Q 1; see fig. 1, Plate X. This shaft is in the same perpendicular line with the shaft C 1, below which carries the face plates C and B, and pulley D. On the top of this lower shaft C 1, is placed a conical coupling Q 2, into which the counter part which is attached to the shaft Q, occasionally falls. The nature of this coupling will be seen in figs. 1 and 10, where the dotted lines indicate the position of the part carried by the shaft Q 1, when it is free of the part connected to the shaft C 1, below. The counter part of the coupling which is connected to the shaft Q 1, is held free during the spinning and coming out of the carriage by the lever q, and counter weight q 1; but as soon as the carriage has arrived at the end of the stretch and the faller is put down, the same movement acting on the series of levers m 1, and m 2, relieves the large lever m 5, which is carried down by the weight m 12. This lever m 5, carries along with it the small lever q 1, as seen at fig. 1, and

allows the weighted lever *q* 2, immediately above it to connect the conical coupling *Q* 2, and thereby identify the shaft *Q* 1 and *C* 1, which are immediately driven from the surface motion of the cone *P*, and any motion of the shaft *Q* 1, is conveyed to the drum band by the pulley *D*. The fall of the lever *m* 5, which connects the coupling *Q* 2, at the same time disconnects the face plates *C* and *B*, which terminates the backing off, and allows the winding on to proceed without interfering with the sector *E*, which is connected to the face plate *C*, by the strap *e*. Thus as soon as the faller wire is put down, and the coupling *Q* 2, has united the shaft *Q* 1, and the shaft *C* 1, beneath. The motion of the strap *P* 4, through the fast pulley *P* 5, is conveyed through the cones *P* and *Q*, to the upright shaft *Q* 1, and drum band pulley *D*, as already described. Supposing, therefore, that the conical coupling *Q* 2, has united the shaft *Q* 1, to the shaft *C* 1, beneath which carries the drum band pulley *D*, and the cones *P*, to be revolved in contact with the cone *Q*, as shown in the drawing, there will be a certain number or amount of revolutions conveyed to the cone *Q*, by the cone *P*, and thence to the drum band pulley *D*; and the number or amount of revolutions will depend on the relative circumference of such parts of the two cones *P* and *Q*, as shall come in contact, the speed of the driving band *P*, being always the same.

In fig. 3, Plate X., the cone *P*, is shown with its apex or smallest circumference in contact with the base or greatest circumference of the cone *Q*, in which position the smallest amount of motion is conveyed from *P* to *Q*, which is the winding on at the greatest circumference of the cop; but supposing the cone *P*, to be vibrated to the position shown in a circle below *P*, in fig. 1, where the base or largest circumference of *P*, would be in contact with the apex or smallest circumference of *Q*, the greatest amount of motion

would be conveyed from P to Q, which is the winding on at the bare spindle or smallest circumference of the cop. From what has been said, and by referring to fig. 3, it will be seen that my variation of speed between that imparted by the apex of the cone P, to that imparted by the base, may be applied for winding on; and in this figure the carriage or frame for vibrating the cone P, upon the cone Q, will be clearly seen, the contact of the surfaces of the two cones being affected by means of the weight R. At the commencement of a cop, or when the spindles are bare, it will therefore be requisite to drive from the base of the cone P, or the greatest speed; but as the cop bottom forms, the cone P, must be vibrated more and more towards its apex, always leaving off at the base, which is the greatest speed or the winding on the base spindle, (when the carriage is near the front rollers). As soon as the cop bottom is formed, the two extremes of speed are required at every winding on, which is effected by vibrating the cone P, its whole range from the apex to the base on every putting up or going in of the carriage.

This vibration of the cone P, is governed by the following arrangement. In figs. 1 and 5, R 1, represents a moving rest or saddle, the upper surface of which is curved in a varied form, as seen in fig. 5; this part R 1, is supported on a carriage, and partakes of a two-fold motion, one back and forth, in the same direction as the traverse of the carriage, and another progressively endwise, in the direction of the arrow seen in fig. 5. The first motion is produced by the pinion R 2, and the rack R 3, as seen in fig. 1, which carries the saddle R 1, in the same direction and at the same time as the carriage when going in or out above the saddle R 1, and resting upon it by means of a friction pulley. R 4, is the lever, R 5, moving on its fulcrum at r 9; the lever R 5, is elevated a varying amount at every traverse

of the saddle R 1, and governed in its position by the position of the saddle R 1. The lever R 5, is connected to the vibrating frame or carriage which supports the cone P, by means of the arrangements of the levers  $r$ ,  $r 1$ ,  $r 2$ ,  $r 3$ , as seen in figs. 1 and 3; so that the position of the lever R 5, determines the position of the cone P, with regard to the cone Q, or, in other words, regulates the relative circumferences of the two cones which must be brought in contact to effect the winding-on motion required.

Fig. 5, represents another view of the saddle R 1, and apparatus connected with it, as seen from the opposite side to that in which it is seen in fig. 1. In this view it will be seen that the saddle R 1, which is carried with the framing R 6, R 6, R 6, back and forth at every traverse of the carriage by the pinion R 2, as already described, receives the second motion by means of the rack  $r$  4, and train of spur wheels  $r$  5 and  $r$  6; and the last of which gears into a wheel  $r$  7, seen in fig. 5, fixed on the end of a screw  $r$  8, which passes forward and takes into a nut which governs the transverse traverse of the saddle R 1, to which it is connected by the piece R 18, as seen in fig. 1. This transverse traverse of the saddle R 1, by means of the screw  $r$  8, also effects a progressive elevation of the saddle R 1, by means of oblique edges on which the near side is supported, as seen at fig. 5.

This rack  $r$  4, vibrates on the stud  $r$  10, so that when it is depressed and put into gear with the spur wheel  $r$  5, the traverse of the saddle R 1, revolves the spur wheel  $r$  5, and imparting motion to the screw  $r$  8, under the saddle R 1, draws it forward in the direction of the arrow seen in fig. 5. Thus the end motion of the saddle R 1, which proceeds from the screw R 8, presents various surfaces of the saddle R 1, to the friction roller and lever R 4 and R 5, and thereby produces the varied elevation of that lever

which governs the vibration of the cone P, and determines the speed of the winding on in the manner before described. The period at which the rack r 4, raises out of gear, depends on an arrangement of catches or stops s, s, s, s, s, s, as shown in the underside of s, and more clearly seen in plan of that part at fig. 6, sheet 2.

Immediately over the ratch lever r 4, in fig. 1, will be seen a similar lever s 1, which is carried by a bell crank vibrating on the centre s 2; this bell-crank lever being acted on by the weight s 3, has a constant tendency to force the lever s 1, in the direction of the arrow; and being at the same time lifted up by the spring s 4, allows the two projections or studs s 5 and s 6, to come one above the other. In this position the outward traverse of the carriage R 6, R 6, depresses the lever s 1, and rack r 4, into gear with pinion r 5, and thereby traverses the saddle R 1, by the screw r 8; but the amount of traverse or period at which the rack r 4, raises out of gear, is terminated by one of the catches s, coming in contact with the end of lever s 1, and forcing it back, so that the studs s 5 and s 6, no longer remain on each other, but resume the position shown at fig. 1, which allows the rack lever r 4, to raise by the action of the spring s 7, and terminate the traversing action of the screw r 8.

The periods at which any one of the stops s, on the underside of the part S, come into action, depend on the period of the formation of the cop bottom, and are arranged accordingly; but as soon as the cop bottom is formed, and the vibration of the cone P, is required to be uniformly alike until the cop is finished, the varied position of the stops s, s, are passed, and the actions of the rack and screw r 4 and r 8, are uniformly the same.

It will be recollected that the large lever m 5, which connected the coupling Q 2, for the purpose of commencing

the winding on, is removed and placed in its former position by the going in of the carriage ; but in referring to fig. 1, it will be seen that the connexion of the coupling Q 2, is continued during the going in of the carriage by means of a catch Q 5, the lever *m* 5, being during the period elevated and supported by the part *m* 4; but as soon as the carriage arrives at the front rollers, and it is required that the winding on cease, the same traverse of the rod *m* 7, by means of the levers O and O 1, (which allows the vibration of upright lever *m* 8,) pulls back the tail end or lower extremity of the catch *q* 5, and allows the preponderance of the weight *q* 1, to liberate or disconnect the coupling Q 2, and thereby terminate the winding-on motion previous to the commencement of the spinning which immediately takes place.

Having described the various arrangements of parts by which I effect the various movements required to render the mule self-acting, and independent of the skill of the spinner, I hereby declare that I do not claim any of the separate or well known parts of which such movements are composed; but I do claim the combination and general construction by which my improvements are effected, as described and set forth in the various figures hereinbefore referred to, particularly those arrangements of parts by which the winding on is effected ; and these my improvements being to the best of my knowledge and belief new, and never before used, I hereby deliver this as my true and faithful specification of the same.—[*Inrolled in the Rolls Chapel Office, May, 1834.*]

Specification drawn by Mr. Nicholson.

*To WILLIAM CHURCH, of Heywood-house, Bordesley-Green, near Birmingham, in the county of Warwick, gentleman; for certain improvements in machinery or apparatus to be employed in the transportation of goods or passengers, parts of which said improvements are also applicable to the ordinary purposes of steam engines.—*  
 [Sealed 7th September, 1833.]

My "invention of improvements in machinery or apparatus to be employed in the transportation of goods or passengers, parts of which said improvements are also applicable to the ordinary purposes of steam engines," consist, in the first instance, in certain variations from the construction and arrangement of apparatus described in the specification of a patent granted to me, the said William Church, and dated the 29th November, 1830,\* for "certain improvements in apparatus applicable to propelling boats and driving machinery by the agency of steam, parts of which improvements are also applicable to the purposes of evaporation;" and apply to the principles upon which I then proposed to take up or recover heat from the eduction vapour of an engine, and transmit it to the generator. My improvements in the second instance applying to the construction and arrangement of apparatus described in the specification of another patent granted to me, the said William Church, dated 9th February, 1832,† for "improvements in apparatus to be employed in the transportation of goods or passengers, parts of which improvements are also applicable to the ordinary purposes of steam engines," and consist in the construction and arrangement of boilers or generators and furnaces applicable to locomotive and other engines; and further, my improvements consist in the means of distilling or evaporating water by the heat of

\* See Vol. VIII., Second Series.      † See Vol. II., Conjoined Series.

the passing eduction steam in order to supply to the boilers or generators any deficiency of distilled water caused by leakage or other escape ; and also to the construction of condensors adapted for locomotive engines.

I proceed to describe the improved mode by which I take up heat from the eduction vapour of an engine, and transmit that heat to the generator.

In my improved construction of apparatus, the eduction vapour, in its progress to the lowest point of temperature in the refrigerator, is conducted by several series of tubes through several distinct vessels, in order that the heat may be abstracted by colder mediums ; and these refrigeratory medii being conveyed in an opposite direction to that of the eduction vapour, transmit the heat thus abstracted again to the generator.

In order to explain the manner in which I carry these principles into operation, I have in the accompanying drawings at fig. 1, Plate XI, given a diagram, representing an apparatus in section, by which the transmission of heat may be effected upon the principles above stated. A, A, A, represents a boiler or generator, from whence a tube B, conducts steam or vapour through the working cylinder to the eduction tube D. This tube leads into the replenishing steam generator E, the particular construction and adaptation of which, not being essential to our present consideration, will be described hereafter.

From the eduction tube D, the vapour passes through the replenisher E, and by the tube F, enters the chamber G, of the condensor, from thence proceeding through a system of descending pipes a, a, a, occupying the vessel H. H. The ends of these pipes are passed through and fixed into partition plates b, b, at the top, and c, c, at bottom. Two other similarly constructed systems of pipes d, d, d, and e, e, e, forming a continuation of the con-

densor, occupy the vessels I, I, and K, K, through which pipes the eduction vapour continues its progress to the lowest point of temperature, the well of distilled water L.

The boiler being heated by a close furnace, the air to support combustion is entirely supplied by the pipe M, leading from the vessel H, to the ash pit; and this vessel H, being perforated on the sides near the bottom, the atmospheric air enters in at those perforations, and in its progress to the furnace takes up and conducts to the generator a portion of that heat which is contained in the eduction steam as it passes through the pipes a, a, a, in its progress of condensation.

In order to give lateral support to the pipes a, a, d, d, and e, e, discs of metal f, are inserted into the vessels H, I, and K, at suitable distances apart, through which the systems of pipes pass. These discs are also perforated with a multitude of small holes, in order to allow the air and water, or other condensing mediums, to flow through the vessels and take up the heat from the pipes.

The distilled water collected in the well L, is drawn therefrom by the air pump N, whence it passes to the hot water pump O, which forces it by the pipe P, through the vessel I, and pipe Q, into the boiler, and in this course it takes up a further portion of the heat from the eduction vapour proceeding through the pipes d. In order to perfect the condensation, a current of cold water is forced by the pump R, through the pipe S, and vessel K, K, and escapes from thence by the discharge pipe T.

This figure, however, is to be considered merely as a diagram, illustrative of the principles of which this part of my improvement is founded.

By any arrangement of apparatus constructed upon these principles, a considerable portion of the heat of the eduction vapour from an engine, as that vapour undergoes

the process of condensation, may be transmitted to the boiler for the purpose of reproducing an elastic vapour capable of exerting mechanical power.

In adapting these principles to an engine to be impelled by the expansive force of atmospheric air or other prominent gases, I should conduct the operation in the manner represented in the diagram fig. 2. In this figure it will be perceived that the air pump N, is open to the atmosphere at bottom, and that by its action a volume of cold air is forced through that part of the refrigeratory apparatus marked I, I, where it takes up a portion of the heat from the eduction current of hot air; and being so heated, proceeds through the ascending pipes Q, to the chamber Z, at top of the generator. From thence the air is impelled through small straight pipes y, y, y, nearly to the bottom of the generator, where it is discharged into the water or other liquid heating medium, and rising through the said medium in small bubbles, passes off in a highly elastic state to the working cylinder by the induction tube B.

The heated air, after having exerted its elastic force upon the piston in the working cylinder, proceeds through the eduction passages to the condensor, where, in its progress through the several systems of pipes a, a, d, d, and e, e, it gives off its heat to the refrigerating medium in the same way as I have described above when treating of steam, and is discharged at bottom into the open atmosphere.

In order to enable a high degree of temperature to be communicated to the air or other permanent gases without injury to the vessel in which it is heated, I employ a liquid medium in the generator, which liquid must be kept under pressure sufficiently great in relation to the temperature of such liquid, as to prevent ebullition; and in the event of a portion of the heating medium being lost by evaporation, that deficiency may be supplied by the replenisher E, [here-

after described,] and passing down through the condenser with the eduction air, descends to the well L, and is thence raised to the generator by the pump O.

In this last described arrangement of the apparatus the tubes *e*, *e*, *e*, and the vessel K, which encloses them, is employed simply for the condensation of that small portion of vapour which proceeds from the replenisher E, and therefore might bear a much less proportion to the entire refrigerating apparatus than is shown in the diagram ; and the vessel I, I, in this instance should be considerably larger in proportion to the whole ; but it is to be remarked that no definite proportions are intended to be given in these diagrams, as they are designed simply to illustrate the principles of my invention.

My improvements in boilers and furnaces are represented in the drawings at figs. 3 and 4. Fig. 3, is a section of one of the boilers and furnaces taken through the middle ; fig. 4, is a horizontal view of the combined boilers and furnaces, one of the chimnies and top of the boiler being removed.

The boiler consists of a box or vessel having a thin stratum of water surrounding the fire, and of a vertical part also containing water, through which a system of tubular flues conduct the flame and heat generated in the furnace. The base or horizontal part of the boiler containing the fire, is formed by double plates of iron placed at about two inches apart, and secured together by bolts, leaving a space for water *a*, *a*, *a*, surrounding the fire on every side. This water vessel communicates with the vertical part of the boiler *b*, *b*, through which the tubes *c*, *c*, *c*, constituting the flues ascend, which are bent at their upper parts, and lead off laterally into the jacket or chimney. The motive for bending these tubes is, that the

joints may not be disturbed by any expansion or contraction of the metal.

A hollow bridge *d*, having open communications at the top and ends with the stratum of water surrounding the fire-place, descends sufficiently to obstruct and cause the smoke to pass immediately over and in contact with the ignited fuel, when, being met by a current of air from the ash pit, more perfect combustion is effected.

The feeding pipe, by which air is conveyed to the furnace, as described in reference to the diagram fig. 1, is shown at *e*; and the steam evolved passes from the upper part of the boiler through the eduction pipe *f*, on its way to the working cylinder.

The fuel is supplied to the furnace through the door, and it is progressively carried forward toward the other extremity of the furnace by the rotation of the fire bars. These fire bars are caused to revolve upon their own axis by any convenient means. A method which I have found to answer the purpose is represented in the detached figs. 5 and 6. The axles of the several bars are supported by side bearing rails *a*, *a*, and to the end of each bar is affixed a ratchet wheel *b*, *b*, *b*. Above this a sliding bar *c*, *c*, is mounted, carrying a series of palls or clicks *d*, *d*, *d*, which respectively take into the teeth of the ratchet wheels. By giving to the bar *c*, a sliding longitudinal reciprocating motion, the palls or clicks will cause the ratchet wheels, and with them the fire bars, to turn upon their respective axles, and in so doing to conduct the fuel progressively along the furnace. The sliding motion of the bar *c*, may be effected by connecting it to any convenient reciprocating part of the engine.

By this contrivance of revolving fire bars the fuel is kept in constant agitation, is progressively carried forward

under the generator in a state of ignition, the ashes are discharged into the ash pit, and the bars are prevented from becoming injuriously heated.

A variation in the construction of the boiler is shown in section at fig. 7, in which the bent tubes *b*, *b*, *b*, contain water, and are externally acted upon by the heat of the furnace below. These tubes communicate at bottom with the stratum of water *a*, *a*, *a*, surrounding the vessel in which they are situate, and at top are open to the steam chamber.

The smoke and hot air from the furnace passes off into the jacket, and to the chimney through the short tubes or openings *c*, *c*, *c*.

As it is extremely important to prevent deposits or encrustation upon the internal surfaces of steam boilers, particularly in such as have very narrow or contracted passages, I think it desirable in my improved apparatus to condense the eduction steam by bringing it in contact with refrigerating surfaces; by doing which I am enabled to return to the generator the greater portion of the water contained in the eduction steam; but it is evident that some loss must be occasioned by leakage and other causes. Now, in order to supply the deficiency of water in the boiler, I have recourse to what I call the replenisher *E*, before alluded to, and which I shall now proceed to describe more particularly.

The replenisher is a box *E*, see fig. 1, having two partitions *g*, *g*, into which the ends of the pipes *h*, *h*, *h*, are inserted. The space between the two partitions is partially occupied with water surrounding the pipe *h*; and the eduction steam from the tube *D*, passing through these pipes, raises the temperature of the water in the box *E*, causing steam to be generated therefrom, which steam rises into the dome *i*, from whence it proceeds by the small pipe

*k*, to the chamber at the end of the box *E*, where it unites with the eduction steam, and passes off with it through the condenser to the well *L*, below.

In adapting these principles to a locomotive engine or steam carriage, I allow the eduction steam to escape into close refrigerating boxes. These boxes are constructed with a great number of tubes inserted into them, through which the cold atmosphere is caused to pass; and the eduction steam coming in contact with the surfaces of these refrigeratory tubes, a considerable condensation is effected.

Figs. 8 and 9, exhibit an elevation and horizontal section of a convenient construction of condenser adapted to a locomotive engine. It is formed by plates of metal *a*, *a*, *a*, perforated with a multitude of holes, into which the small tubes *b*, *b*, *b*, are inserted transversely, and secured by soldering. The eduction steam enters the box by the pipe *c*, and diffusing itself among the tubes, becomes condensed by the contact of the cold surfaces, the water running off through tubes *d*, *d*, below into suitable reservoirs, and the remaining uncondensed escapes by the tubes *e*, *e*, into the chimney. The current of atmospheric air drawn or forced through the tubes by a rotary fan or other suitable contrivance having become heated in its progress, is impelled from the chamber *f*, through the tube *g*, into the ash pit of the furnace, and thereby transmits the absorbed heat to the generator.

In the event of working an engine by the expansive force of air or permanent gas, it is necessary to adapt an apparatus which shall be capable of regulating the supply of air to the generator, such supply of air only being required as shall preserve any determined proportion between the elasticity of the air and its temperature within the generator. Fig. 12, represents in section an apparatus

designed to effect this object. A glass bulb *a*, containing mercury is immersed in the heated air within the generator, in the cylindrical stem of which is introduced an iron plunger *b*, accurately but loosely fitted, allowing a thin stratum of mercury to encircle it. The mercury in this bulb acting as a thermometer will, as it expands and contracts, cause the plunger *b*, to rise and fall. An open tube, *c*, inserted into the top of the generator, has a plunger, *d*, accurately and closely fitted air-tight, which is raised by the expansive force of the air, against the resistance of a helical spring. The upper parts of the stems of the plungers *b* and *d*, are formed with racks which take into and support a toothed segment lever *e, f*.

It is evident that as the segment lever is supported by the racks of the plungers only, that as they are elevated or depressed the segment lever will be moved up or down with them ; but if the plungers *b* and *d*, are unequally raised or depressed, the segment lever will receive a corresponding degree of rotative movement. From the centre of this segment lever a long spindle extends, and at its opposite end turns in a bearing, and its extremity is connected by a crank lever to a throttle valve situated in the induction tube of the cold air pump. It will now be perceived that when the temperature of the air in the generator is in excess. that the mercury will cause the plunger *b*, to elevate the end *e*, of the segment lever, whereby the crank at the extremity of the spindle will be turned and the throttle valve consequently opened, by which a greater supply of cold air will be admitted into the cold air pump and forced into the generator, and the temperature is thereby reduced. On the contrary, when the elastic force within the generator is in excess, the plunger *d*, will be raised, and the end *f*, of the segment lever relatively

elevated, and through the medium of the spindle, the throttle valve will be relatively closed.

In further illustration of these improvements, I have exhibited in elevation at figs. 10 and 11, a pair of engines embodying the principles above set out, which are suited to marine and other purposes. In these figures the parallel motion and gearing for working the slide valves are omitted, as not essential to the explanation of the present improvements. Fig. 12, is a horizontal section taken through the upper part of the framework in the line a, b, and fig. 13, is another horizontal section taken through the bottom of the framework in the line c, d. Fig. 14, is a vertical section through the framework in the line e, f; and fig. 15, is a similar section taken in the line g, h, all which said sectional figures are designed to show the arrangement of the refrigerating chambers and passages for the eduction vapour. In the last mentioned figs. the respective letters of reference point out corresponding parts of the apparatus as described in the diagram, fig. 1.

A, is the generator and furnace; B, the induction pipe; C, the working cylinder; D, the eduction tube leading to the replenisher E, from whence the eduction vapour passes to the chamber G, and descends through the system of pipes a, a, a, in the vessel H, to the chambers g, g, then proceeding upward by the passages h, h, it enters the chambers i, i, and passes down the pipes d, d, d, contained in the vessel I. The eduction vapour having arrived at the chamber k, will now rise through the middle passage l, into the upper chamber m, whence it will descend by the pipes e, e, e, occupying the vessel K, into the well L, from which the distilled water is to be drawn by the pump N, and conveyed by the hot water pump O, through the pipe P, into the vessel, whence it will pass by the pipe Q, to the gene-

rator. The supply of cold water to the third refrigerating vessels K, K, is forced by the pump R, through the pipe S, into those vessels, and is discharged by the pipe T. The supply of air to the furnace rises through the vessels H, H, and is conducted by the passages M, as before described. The supply of water to the replenisher E, may be effected by any convenient means. Lastly, it may be necessary to observe, that although in the above description I have represented the eduction vapour as passing through the several systems of tubes, yet it must be obvious that a similar object might be effected by passing the refrigerating mediums through the tubes and the vapour through the vessels in an opposite direction.—[*Enrolled in the Rolls Chapel Office, March, 1834.*]

Specification drawn by Messrs. Newton and Berry.

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To JOHN TRAVIS, the younger, of Shaw Mills, near Manchester, in the county palatine of Lancaster, cotton spinner, for his invention of certain improvements in machinery or apparatus for spinning wool, cotton, hemp, flax, or other fibrous materials.—[Sealed, 1st November, 1833.]

THESE improvements in apparatus for spinning apply to that particular construction of spinning machinery commonly called or known by the names of mule, billey, jenney, and stretching-frame, and consist in a new mode or method of working the apparatus called the counter-faller, in connexion with the faller, by which the yarns are more tightly wound upon the spindles as the carriages run in, than can be effected by the ordinary construction of such machinery; and which improved mode of working the counter-faller in a great measure supersedes the necessity of backing off, or

giving a retrograde movement to the spindles for the purpose of unwinding the coiled yarns from the points of the spindles previously to their being wound on to the cops.

In the accompanying drawings (see Plate XII.), fig. 21, represents a portion of the front of a mule carriage, with the improved parts adopted thereto. Fig. 22, is a transverse section taken through the carriage for the purpose of showing the operations of the improved parts more evidently.

The construction of the carriage is the same as in ordinary mules having a series of upright spindles *a*, *a*, *a*, driven by bands or cords from a rotary drum barrel or roller *b*, which is actuated by the usual machinery, as the carriage runs in and out upon the edges of the iron rails *c*, *c*. The faller *d*, is a longitudinal wire extending along the carriage, and which is connected by arms to a longitudinal shaft *e*, mounted in brackets *f*, affixed to the front of the carriage. This wire *d*, is enabled to rise and fall in the direction of the dotted segment shown in fig. 22, by partially turning the shaft *e*, upon its axis, which movement is given to the shaft by the hand of the spinner when the carriage runs in for the purpose of guiding the yarns in uniform coils round the spindles to form the cops as they are wound on.

The counter-faller *g*, is a rod or slight bar of metal placed longitudinally along the carriage parallel to the faller. It is mounted like the pillar or arms *h*, *h*, but sliding loosely round the shaft *e*, by which it is made capable of moving up and down in a similar curve to the faller. The lower part of the arm *h*, is formed into a segment rack *i*, intended to take into the teeth of a correspondent segment rack *k*, affixed to the lower longitudinal shaft *l*, *l*, the pivot of which shaft *l*, turns in bearings *m*, attached to the brackets *f*.

The shaft *l*, with its segment rack *k*, taking into the corresponding segment rack *i*, on the arm *h*, governs the

position of the counter-faller *g*; and the elevated position of the counter-faller shown in fig. 22, is effected by means of a weighted cord *m*, attached to the periphery of a pulley *o*, fixed on the shaft *l*, which pulls the segment rack round and raises the counter-faller. But in order that the counter-faller may not rise too high when the carriage runs out, a stop lever *p*, is fixed upon the shaft *l*, which stop at this time bears against the notch or edge in the vertical lever *q*.

This lever is kept up bearing against the end of the stop by a spring *r*, affixed to the front of the carriage, but when the carriage has run out to the extent of the stretch and the yarns are about to be wound on them, the vertical lever *q*, is thrown back by the action of a horizontal lever behind the shaft *e*, which at that time is to be pressed by the finger of the spinner. This lever is shown at *s*, in the horizontal view of that part of the machine represented in the detached fig. 23.

The faller wire *d*, is at this time raised to that part of the dotted curve marked *z*, in fig. 22, which is above the points of the spindles, when, by the liberation of the stop *p*, the weighted cord *n*, is enabled to draw the rack and shaft *k* and *l*, further round, by which means the counter-faller *g*, rises also above the points of the spindles; but the extent of the arc through which the shaft and segment rack *l* and *k*, are enabled to turn, is limited by a stop lever *t*, fixed on the shaft *l*, as seen in fig. 22.

By the rising of the counter-faller *g*, above the points of the spindles in the way described, the loose coils of yarn twisted round the naked parts of the spindles above the cops are drawn off, by which means the ordinary operation of giving to the spindles retrograde movements to effect what is technically called backing-off, is in a great measure, if not entirely, rendered unnecessary.

Lastly, having found it desirable, for the better illustra-

tion of my invention, to describe several parts of the ordinary mule for spinning cotton and other fibrous materials which are not new, I desire it to be understood that my present invention consists simply in the means and mechanism above described, by which I am enabled to work the counter-faller, for the purpose of giving increased tension to the yarns in winding on to the spindles, and also to draw off the coiled yarns from the upper ends of the spindles to supersede the necessity of backing off.—

[*Inrolled in the Rolls Chapel Office, May, 1834.*]

Specification drawn by Messrs. Newton and Berry.

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*To ANDREW SMITH, of Princes-street, Leicester-square, in the parish of St. Martin in the Fields, in the county of Middlesex, mechanist, for his invention of certain improvements in springs for doors, and other purposes.—*  
[Sealed 5th October, 1833.]

THESE improvements in springs for doors and other purposes, apply to the construction of springs applicable to the closing of doors and casements of windows that open horizontally, or to other situations where such springs may be required : which improvements consist in a peculiar form and novel adaptation of spring or springs and levers, which, when attached to a door or casement, will cause that door or casement to close and remain closed.

The accompanying drawings, (see Plate XII,) exhibit the construction of the spring and its appendages, as adapted to a swinging door. Fig. 17, is an elevation of the lower part of the door with the box containing the spring, shown sideways as let into the floor. Figs. 18 and 19, are horizontal views of the box containing the spring and levers, the upper plate being removed. Fig. 20, is a vertical sec-

tion of the box taken in the same direction as fig. 17; *a, a*, is the box or metallic case which encloses the springs and levers; *b*, is the centre pin or pivot upon which the door turns (shown by dots in fig. 20). This pin is firmly secured to the bottom of the box by a nut and screw, or other fastening; *c, c*, is a metallic shoe fixed on to the heel of the door by screws, or other convenient means.

A centre piece *d*, formed square at the top part, and having a recess or inverted cup at its lower part, is secured into a socket in the shoe by a screw and washer, or otherwise. Upon this centre piece *d*, bearing upon the pin *b*, as a pivot or hinge, the door turns when opening or shutting.

From the side of the piece *d*, an arm or lever *e*, extends, having an anti-friction roller at its end acting against the internal surface of a pair of bent levers *f, f*, shaped as callipers, which levers turn upon a hinge joint formed by the pin *g*, screwed into the bottom of the box *a*.

These levers are pressed together by one or more circular or crescent-formed springs *i, i, i*, the ends of these springs bearing with considerable tension against the sides of the levers *f, f*; and when the levers are in a quiescent state, as in fig. 18, their extremities rest against the stop *h*, which is the position of the parts when the door stands closed, or as shown by dots *A, A*, in that figure.

The operation of the spring is as follows:—When the door or casement is closed, the spring and levers remain in the quiescent state last described; but on the door being swung either backwards or forwards, the end of the arm or lever *e*, is made to act upon one of the levers *f*, forcing its extremity from the stop piece *h*, as shown in fig. 19. The spring *i*, by these means becomes expanded, and its tension being thereby increased, when the door is let go the spring immediately begins to collapse, and its ends acting with great force against the backs of the levers *f, f*,

presses them together. The force thus exerted through the spring *i*, upon the levers *f*, *f*, causes the internal parts of the curved surfaces of the levers to force the arm *e*, back again into the position shown in fig. 18, and consequently to bring the swinging door which is connected with this arm *e*, and centre piece *d*, into the closed position, as shown by dots in the last mentioned figure.

When it is desired that the spring should be made to keep the door or casement standing open, it is only necessary to move the arm or lever *e*, a sufficient distance to carry the centre past the end of the lever *f*, (that is, into the position shown by dots in fig. 19,) when the spring will cause the end of the lever *f*, to press against the anti-friction roller, and confine the arm *e*, in that position, and consequently keep the door open. The spring can be at any time brought into action to close the door, by moving or turning the door sufficiently to bring the centre of the arm *e*, within the end of the lever *f*.

It is necessary to remark that the top part of the door must be furnished with a centre pin and socket, upon which it can turn freely, and that such pin should be in perpendicular coincidence with the pivot *d*, *e*, below. It will be perceived that the force of the spring *i*, may be increased or diminished by shifting the position of their ends further from or nearer to the centre pin *g*, of the levers *f*, *f*, for which purpose it may be desirable to form grooves or notches in the backs of the levers *f*, *f*, suited to receive the ends of the springs; and the spring *i*, may be made of any suitable strength; or several circular or crescent-formed springs may be combined together in the way shown.

One important feature connected with this construction of apparatus for closing doors or casements, consists in adapting springs without any fixed fulcrum, as it will be

perceived that they are held solely by their tension and pressure upon the levers *f*, *f*, and consequently, being thus free, every part of the circular or crescent-formed spring is brought into elastic operation.—[*Inrolled in the Rolls Chapel Office, April, 1834.*]

Specification drawn by Messrs. Newton and Berry.

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*To STEPHEN PERRY, of Wilmington-square, in the parish of St. James, Clerkenwell, in the county of Middlesex, gentleman; EDWARD MASSEY, senior, of King-street, in the same parish, watch-maker; and PAUL JOSEPH GAUCI, of Charles-street, Middlesex Hospital, artist, for certain improvements in pens and penholders.—[Sealed 19th November, 1833.]*

THIS invention consists, first, as regards the improvements in pens, in the application of auxiliary springs, for the purpose of forcing the points of the nib together quickly and tightly after making a down stroke; and, further, in the application of various contrivances, which are called ink retainers, for retaining a quantity of ink just above the nib, so as to form a sort of magazine that will supply the writer for a considerable time after one dip of the pen in the ink.

Secondly, as regards the improvements in penholders, in adding to them such parts as will, when the ordinary steel pen is put into them, form such a magazine as aforesaid; and, further, in the addition of what is termed an elastic or flexible piston to such penholders as are made hollow, for the purpose of containing ink.

Plate XII., figs. 1, 2, and 3, represent steel pens, each furnished with an auxiliary spring, such spring being a

thread ring or loop of India rubber or caoutchouc, held in its place by means of notches cut in the sides of the pen, as shown in figs. 4 and 5.

Fig. 1, is a back view of the pen when the loop is on, and fig. 2, a front view of the same. Fig. 3, shows the loop crossed over the front of the pen; the back view, under these circumstances, would be the same as in fig. 1. Fig. 6, is a mere band of thin India rubber, drawn gently round the pen, its two ends being stuck together at the front of the pen.

In all the above cases, it is evident that whenever, by the down stroke of the pen in writing, the points of the nib are opened, a stretching of the India rubber will take place, and the moment the pen rises for the up stroke the India rubber will contract and draw the points of the nib closely together, whereby the patentees are enabled to make the slits of the pen longer; thus adding greatly to its elasticity, without the danger of the points of the nib opening too far, and not closing quickly enough.

Fig. 7, is a steel pen furnished with one of the contrivances for retaining a quantity of ink just above the nib; the part marked *z*, is a thin piece of metal, made concave towards the pen, and shown separately at fig. 8. This piece is wide enough to touch the sides of the pen when fixed to its place, and is held fast by the pin or rivet *e*; it has a small air-hole at *r*, fig. 8; and if the pen so furnished be dipped into the ink, it will take up and retain enough ink for many lines of writing.

Fig. 9, is another contrivance for a similar purpose. It consists of a piece of elastic metal, formed as shown separately at fig. 10, which is to be slipped into the pen as shown at fig. 9, where it performs the double office of an auxiliary spring, and of an ink retainer; for the part *s*, being elastic, clasps the pen, and, after the points of the nib have been

opened for the down stroke, draws them together as they rise for the up stroke, in the same manner as the India rubber ring before mentioned, and which is considered to be better for the purpose.

Fig. 11, is another contrivance for retaining the ink as aforesaid, fixed to the back of the pen and turning up a little way in front. This piece should be about as wide as the pen at its middle part, and tapering gradually downwards, so as not to interfere too much with the nib, which protrudes through an aperture made for it at the bend of the ink retainer. This piece is also made a little concave towards the pen, as shown separately at fig. 11, *a*.

Fig. 12, represents a penholder with one of the said contrivances attached thereto, *t*, being one of the ink retainers made as part of the holder, and thus constituting an improved penholder. When an ordinary steel pen is pushed under the ring *w*, which is placed there for the purpose, it assumes the appearance shown in this figure; and the extra quantity of ink is retained as effectually as if the ink retainer were fixed to the pen, as in fig. 7. It should be observed, in this case, that the ink retainer should not fit close to the sides of the nib of the pen.

Fig. 13, represents another penholder, with another of the said improvements drawn in section. This holder is hollow, and has a rod *f*, with a valve *g*, at its lower end; the upper part of this rod has a screw, by means of which it is either raised or lowered. The upper part of the rod also must work up and down in stuffing of some sort, so as to exclude the air; *h*, is what is called an elastic piston, and consists of a small conical shaped funnel, fixed on to the holder at *i*; this funnel is covered with a thin sheet of India rubber, so tightly fixed on as to exclude the air.

In order to use this holder, raise the valve *g*, then press hard with the end of the finger on the sheet of India

rubber, immersing at the same time the extremity *k*, of the holder in ink. Now remove the pressure from the India rubber, and the ink will immediately ascend into the holder, when the valve *g*, should again be closed.

When a flow of ink is required for writing, raise the valve as little as possible, and press gently on the elastic piston, which will instantly cause sufficient ink to flow into the pen.

The pen in this holder slides up between the piece *l*, fig. 14, which is soldered on to the holder at *m*, and the holder is held firmly to its place by the slide ring *n*. Fig. 14, is a view of the holder and pen complete.

Fig. 15, shows another mode of effecting the same object, the funnel being in this case furnished with an air-tight bag instead of a sheet stretched over it, as before. The pushing in and drawing out of this bag, which is called the flexible piston, draws in or forces out the ink, as before described, when required.

Now, whereas it is evident there are many ways of applying such auxiliary springs, ink retainers, and elastic or flexible pistons as aforesaid, but we have described only such as we have found to answer best; and whereas we claim as our invention, first, the application of such auxiliary springs as aforesaid for the purpose aforesaid, and also the application of such ink retainers as aforesaid to metal and other pens; and, secondly, the application of what we call ink retainers to penholders, and of what we call elastic and flexible pistons to penholders as aforesaid; and such our invention being to the best of our knowledge and belief new, &c.—[*Enrolled in the Rolls Chapel Office, May, 1834.*]

Specification drawn by Mr. Rotch.

*To THOMAS TODD, of Kingston-upon-Hull, in the county of York, shipping-agent, for his invention of certain improvements in machinery or apparatus for raising water and other liquids.—[Sealed 24th November, 1832.]*

THIS invention consists of a peculiar combination and arrangement of certain parts of common pumps, either lifting, forcing, or syphon pumps, as well also as of certain parts of the engines already known for extinguishing fires.

The Patentee says, " from the very simple mode of effecting those combinations, my machine or apparatus can, without the least trouble, at any time and under any circumstances, in one minute, be converted from its use (as a pump for common purposes) into a double pump, discharging or raising water, &c., both by the ascent and descent of a single piston; thus discharging the same quantity of water as any other common pump of the same size with only half the labour, or discharging double the quantity to any common pump of the same size with the same labour. It can also in one minute, with the greatest ease, be converted into a most effective engine for extinguishing fire, or into a most complete syphon of very great power, or for raising water to great heights from deep wells.

" On board ships it will be found invaluable, from the ease with which it works, and the quantity of water it discharges; and in all cases of fire at sea the vessel may be filled with water by the self-action of the syphon to any height in a few minutes; while at the very same moment the engine, with only the exertions of two men, may be throwing a very powerful and constant stream of water on the upper part of the ship or cargo: thus many valuable lives, ships, and cargoes, might be preserved.

" My very simple mode of combining and arranging cer-

tain parts and principals of all other pumps and engines, and for which I claim an exclusive privilege, is effected as follows, namely:—I make the principal or main part of my apparatus or machine of three separate and distinct tubes, channels, pipes, or compartments, of different sizes or shapes, according to circumstances, and which I join together by flanches in the usual way when they are not made in one piece; but from experience I prefer having them made in one piece, either of wood, copper, brass, cast-iron, or any other proper metal or material; but in practice I very much prefer cast-iron, and in such case I have these compartments, channels, or pipes, cast in one piece, but divided from each other by a partition.

“The middle tube or pipe I call the working barrel or chamber: it is accurately bored, and forms a communication with each of the side pipes or tubes, namely, with one side at its top end, and with the other side at its bottom end.

“This working barrel or chamber is closed by a reversed stuffing box on its upper end, which stuffing box is always covered with water, and to the height of five or six inches, which most effectually prevents the admission of air to the apparatus.

“At the top and bottom of each of the side pipes or tubes there are valves fixed, all opening upwards and into one channel or receiver. From this channel or receiver there is one opening for the issue of the water in one stream, either to the air vessel, when the apparatus is wanted as a fire engine, or into the rising main, when wanted to raise water to any great height; but if for common purposes only, the water is delivered (through the opening in the channel) into the cistern (which is also cast in one piece with the three pipes or tubes), and is discharged by its spout.

“ To the bottom part of the three tubes or compartments mentioned above, I annex what I call an air chest, or rather a general receiver, to which general receiver is annexed any number of suction pipes that may be wanted for different purposes, each pipe having its own stop-cock to shut it off.

“ On the opening in the channel from whence the water is discharged into the cistern, there is a male brass screw, by which the air vessel is screwed on when the apparatus is wanted as a fire engine; or the rising main is screwed on when wanted to raise water to any height for other purposes.

“ At one end or side of the air chest or general receiver is an opening with a brass male screw for screwing on the suction pipe (of leather or copper, or any other proper material, but from practice I prefer a copper one for the use of ships), which suction pipe goes over the gunwale, and down the outside of the ship a little below the water line. This suction pipe forms the tail pipe of the fire engine, should there not be any water in the ship; or it forms the siphon when water is wanted into the ship.

“ When the siphon is not wanted, and there is plenty of water in the ship, there is no occasion to screw on the engine suction pipe; and at all times when the main suction pipe to the bottom of the ship's hold is not wanted, it must be shut off by its stop-cock.

“ When this machine or apparatus is used as a fire engine on land, or for raising water very high from wells, the main pipe to the well or reservoir is sufficient, and the engine suction pipe is not at all wanted.

“ I make the whole or part of this my machine or apparatus of metal or wood, or wood and metal together; and I make the valves of wood and leather, or metal but

chiefly of brass or copper, according to price and other circumstances. The piston rod I make of copper, or any other proper metal or material, as well as the piston; and I use all or any of the well-known methods of packing the same for the different purposes of hot and cold liquids. I also use all or any kind of valves, such as are well known to be in common use, and according to circumstances. I also make my machine or apparatus of all sizes, so as to be easily worked by manual labour, or by any other power, such as steam, horses, wind, water, or air."

Plate XII, fig. 24, is a perspective view of the machine: the same letters refer to the same parts in all the figs.; *c*, a part of the piston rod at half the up stroke; *d*, the main suction pipe to the water; *e, e*, the chest or box that receives the water from the suction pipes; *g*, the place of a stop-cock for shutting off or closing the main suction pipe and syphon, when fixed on board ship, but not wanted for land purposes; *h*, a brass screw, to which is affixed a suction pipe; *g*, when wanted for a fire engine; *l, l*, the deck of a ship, or the ground line with the pump fixed thereon; *m*, the cistern from which all the water is discharged by the spout; *o*, when acting as a pump for common purposes; *p*, an air vessel, which is screwed on in the cistern at *n*, (see the plan view of cistern, fig. 27,) when acting as a fire engine; *q*, a copper suction pipe for the engine and syphon on board ship; the bent part is placed over the gunwale of the ship; *r, r*, shows the leather or canvas hose for the engine; *s*, the branch or spouting pipe for throwing a large stream of water when screwed as a fire engine, which is screwed into the hose; *t*, a strong iron standard at one end of the cistern, which can be taken away at pleasure when not wanted; *u, u*, the double lever or handle for working the machine, with its joints and shackles, and

which together with the standard *t*, may be taken away when not wanted ; *v*, the place in the air vessel where the hose for the engine screws on.

Fig. 25, is a front vertical section through the middle of fig. 24 ; *a, a*, the working barrel or chamber of brass or iron accurately bored ; *b*, a solid piston of brass ; *c*, the piston rod ; *d*, the main suction pipe to the bottom of the ship, or, if on land, to the water in the well, and grated at the bottom end ; *e, e*, the receiving chest or box ; *f*, the stuffing box, always covered with water to the height *k, k*.

The place of the stop-cock (shown detached at fig. 30,) is at *g*, to which the suction pipe *g*, is affixed when wanted as a siphon or fire engine ; *i, i*, the deck or ground line ; *j 1, j 2*, the places for the two lower valves or boxes of brass ; *j 1*, being open, and *j 2*, shut ; *j 3, j 4*, the two upper valves or boxes ; *j 3*, being shut, and *j 4*, open ; *k, k*, two bonnets or covers over the upper valves, to be screwed down tight in their places, when acting as a fire engine ; *l, l*, two small copper rods, affixed to the lower valves by a loose joint, for the purpose of the more easily drawing out the valves at any time for examination ; *m, m*, the cistern : the two arrows show the course of the water in the barrels at the up stroke or ascent of the piston, and the contrary takes place on the descent ; the other two arrows show the course of the water through the pipes *d* and *g*.

Fig. 26, is a horizontal view of the cistern when the machine is not made to act as a fire engine.

Fig. 27, is a similar view of the cistern when the machine is made to act as a fire engine ; *n*, shows the place where the air vessel is screwed on.

Figs. 28 and 29, shows the valves complete, and ready for dropping into their seats or places, fig. 28 being open, and fig. 29 shut. The moving clacks or buttons, *x, x*, are guided in their places by the narrow edges of their three angular

leaves, which just fit and move freely in the inside of the main pieces *y*, *y*, by which a greater passage is allowed for the water.

Fig. 30, shows the plug of the stop-cock *g*, which is only allowed to turn one quarter round, its pointer *w*, being vertical when open, and horizontal when shut.

Fig. 31, is a brass bonnet or cover for the screw *h*, when the suction pipe is taken away, and is always secured to the pump by its chain *z*.

" For the more easily drawing out the valves for examination, I annex, by a loose joint, a small copper rod to the lower valves, by which they can be drawn up by the hand at pleasure, without any trouble, and this I claim as my invention, as well also as the simple mode of combining all the parts of the apparatus, but particularly the air chest or general receiver, the situation of the valves, and the prevention of air by the stuffing box ; this I claim as my invention, and are, to the best of my knowledge and belief, entirely new, and never before used in this manner in this kingdom ; but I do not claim any exclusive right to the principles of the double pump, having, as before stated, obtained a Patent of such pump thirty-six years ago ; neither do I claim any exclusive right to any sort or number of valves, or the material of which they are made, considered separately ; and I use all or any such valves and other parts of pump work as have heretofore been, and are at present used, for such purpose, according to circumstances ; but I claim an exclusive right to this my mode or method of converting this my machine into a very powerful syphon at pleasure, for all purposes where such syphons are wanted."—[Inrolled in the Inrolment Office, May, 1832.]

## SUGAR REFINING.

(Continued from p. 203.)\*

## Statement of Fifth Experiment.

	Cwt. qrs. lbs.	Cwt. qrs. lbs.
Weight of Sugar melted for refining	- - -	311 3 9
Total extract in loaves, lumps, bastards, and treacle	- - -	290 1 1
Loss (7½ per cwt.)	- - -	21 2 8
		<hr/>
Extract in Double loaves 78 1 15	Cwt. qrs. lbs.	£ s. d.
„ Single ditto 124 — 23	„	211 13 6
„ Bastards 46 1 5	„	285 13 8
„ Treacle 41 1 14	„	69 8 7
		<hr/>
Deduct from Drawback 1-5th	- - -	566 15 9
		113 7 2
Net Drawback	- - -	453 8 7
		<hr/>
Duty on 311 3 9 at 2½ per cwt.	- - -	374 3 11
Apparent Loss to Revenue on 15½ tons	- - -	89 4 8
Duty, at 29s. per cwt., amounts to	- - -	453 8 7
		<hr/>
Cwt. qrs. lbs.	Cwt. qrs. lbs.	
78 1 15 Double loaves	= 92 — 1 Single loaf.	
Single loaf	124 — 23	
	<hr/>	
Total extract in Single loaf	216 — 24	

Hence by proportion,

Cwt. qrs. lbs.	Cwt. qrs. lbs.	lbs.	lbs. per cwt. of Raw Sugar.
If 311 3 9 : 216 — 24 : : 112 : 77,66 in single loaf.			
311 3 9 : 46 1 5 : : 112 : 16,65 in bastards.			
311 3 9 : 41 1 14 : : 112 : 14,84 in treacle.			

Otherwise in 112 lbs. by direct weight :

	lbs.
Double loaf	28.16
Single ditto	44.74
Bastards	16.66
Treacle	14.84
Waste and Loss	7.61
	<hr/>
	112.00

\* By an error of the printer, pages 204 and 205 have been placed before these Experiments, they should have followed.

*Sixth Series of Experiments.*

The subject of this Experiment was a Muscovado Montserrat sugar at 53s. per cwt. being only 8d. above the Gazette average price of the day. Its grain was good, but had somewhat the appearance of the crystalline form produced by very slow refrigeration in the Colonial coolers. It was clean, but had somewhat of a yellow tinge, whereas the preferable refinery sugar has a grey cast. This was by far the best Muscovado sugar placed at my disposal; and as the apparatus was all in a complete state, I was confident of producing from it satisfactory proportions of refinery extracts. The tabular statements by the Custom-house officer, hereto appended, will prove the superior quality of the boils. It will be seen that our fourth day's work produced loaves equal to the double standard, from an admixture of raw sugar and *green syrups* in nearly equal weights; a result almost unprecedented in sugar refining. I was therefore sanguine in my hopes of maximum extracts, especially since every source of waste was diligently avoided. Here we did not need to have recourse to the preliminary operation of making meltings, as the hogsheads contained no appreciable quantity of *foots*.

The first day's work seems to have been honestly and fairly made, for 35 cwt. 1 qr. 11 lbs. produced 152 Hamburg loaves, equal to double standard, which when brought to the scale, weighed 13 cwt. 2 qrs. 13 lbs., being at the rate of  $39 \frac{1}{2}$  lbs. for every 100 lbs. of sugar melted. This proportion is fully better than that yielded by the sugar of the third experiment, and may serve for a type or test of ulterior operations.

The next day's work, on January 29th, five days after the preceding, included the scum liquors of the previous day's work, and therefore affords a still higher proportion of extract; for 32 cwt. 3 qrs. 18 lbs. yield 14 cwt. and 25 lbs. of loaves, being at the rate of  $43 \frac{1}{2}$  per cent.

The third day's work, on January 31st, is still better, for on 33 cwt. 2 qrs. 1 lb. of sugar melted, including scum liquor, there are 15 cwt. 2 qrs. 15 lbs. which is no less than 48 per cent.

The fourth, fifth and sixth days' work were all apparently well

conducted, producing equally high proportions of refined sugars. In the first five days' work no less than 79 cwt. 1 qr. 17 lbs. of sugar, equal to double standard, was extracted from the melting of only 151 cwt. 3 qrs. 20 lbs. of raw sugar; being less than one-half of the whole quantity purchased for the experiment. The sixth day's work afforded very nearly 20 cwt. of single loaf sugar, from about 26 cwt. of raw sugar boiled up with green syrups.

Thus in six days' work 100 cwt. of refined sugar were realised. The future boilings went on with similar success, and without any visible source of loss or waste; and yet, on summing up the whole, there is a deficiency of weight, chiefly in bastards, for which no reason can be easily assigned but secret theft or destruction of these syrups.

*Statement of Sixth Experiment.*

	Cwt. qrs. lbs.
Weight of Sugar melted for refining	305 1 15
Added from the residuum of Fifth Experiment	1 2 20
	<hr/>
	307 — 7
Total extract in loaves, lumps, bastards, and treacle	280 3 10
	<hr/>
Loss and waste	26 — 25

The loss here is  $9\frac{1}{2}$  lbs. per cwt., being nearly double the loss on the inferior and much fouler sugar of the third experiment.

Cwt. qrs. lbs.	Cwt. qrs. lbs.	£	s.	d.
Extract in Double loaves 113 1 20	Drawback a' 54s. p' cwt. 306 5 2 $\frac{1}{2}$			
" Single loaves 98 3 19	46s. " 227 10 3 $\frac{1}{2}$			
" Bastards - 28 — 26	30s. " 42 7 8 $\frac{1}{2}$			
" Treacle - 40 1 1				
		<hr/>	<hr/>	<hr/>
Deduct 1-5th		576	2	8 $\frac{1}{2}$
		115	4	6 $\frac{1}{2}$
		<hr/>	<hr/>	<hr/>
Net drawback		460	18	1 $\frac{1}{2}$
Duty at 24s. per cwt.		368	9	4 $\frac{1}{2}$
		<hr/>	<hr/>	<hr/>
On 307 cwt., Loss to Revenue		98	8	9
		<hr/>	<hr/>	<hr/>
Duty at 30s. per cwt. = the Drawback		£ 466	18	0

Cwt. qrs. lbs.	Cwt. qrs. lbs.
113 1 20	Double loaves = 133 1 22 $\frac{1}{2}$ Single loaves.
	Single loaves = 98 3 19

Total extract in single loaves 232 1 13 $\frac{1}{2}$

Hence by proportion :

Cwt. qrs. lbs.	Cwt. qrs. lbs.	lbs.	lbs.
If 307 0 7	: 232 1 13 $\frac{1}{4}$	: : 112	: 84.76 Single loaves.
307 0 7	: 28 0 26	: : 112	: 10.30 Bastards.
307 0 7	: 40 1 1	: : 112	: 14.56 Treacle.

Otherwise in 112 lbs. by direct weights :

Double loaves	-	-	-	41.37	77.43
Single loaves	-	-	-	36.06	
Bastards	-	-	-	10.30	
Treacle	-	-	-	14.67	
Loss	-	-	-	9.60	
				<u>112.00</u>	

The waste in this experiment has been made in the syrups, of which the quantities, collected from the drainings after 14 tons of the sugar had been worked up by the 5th March, are remarkably scanty. In this respect the fourth and sixth experiments may be compared, for the number of boilings and re-boilings was nearly the same, and the weights of the sugars differed only 3 cwt. in favour of the sixth, yet in the course of this experiment, and with a Muscovado sugar, only 455 pots of syrup were collected; while in the fourth, with a clayed sugar devoid of Molasses, 515 pots were collected; the difference is 60 pots. The average weight of sugar in the syrup of one gathering pot may be taken at 50 pounds; therefore the contents of fully 20 seem to have been abstracted.

In fact, the more frequently the sugar is turned over in refining, the more numerous are the clayings, and the oftener the drainage pots are replenished. The sixth experiment on Muscovado sugar should have exhibited an excess in the number of the gathering pots over that of the fourth, instead of a great deficiency. I have observed that in consequence of the improvement in the boiling properties of the pan, introduced after the fourth experiment was finished, our syrups continued remarkably light coloured and free from viscosity, circumstances which forcibly struck several experienced refiners. When I considered, moreover, the great productiveness of each day's work, relative to the quantity of materials put into the pan, I could not help anticipating a corresponding result on the whole.

(To be continued.)

### List of Patents

*Granted by the French Government, from the 1st of October to  
the 31st of December, 1833.*

#### PATENTS FOR FIFTEEN YEARS.

- To MM. Wheatley and Riste, of Leicester, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, Rue Choiseul, No. 4, for improvements in the machine used for making bands of bobbin net with edging or quilling.
- Wheatley and Riste, of Leicester, represented in Paris by Mr. Perpigna, for improvements in the machines employed for making bobbin net.
- Humphreys, William Henry, of London, represented in Paris by Mr. Perpigna, for improvements in the methods of refining oils of every kind.
- Bland, Isaac, of Manchester, represented in Paris by Mr. Perpigna, for certain improvements in making, roving, spinning, and twisting cotton, flax, silk, and other fibrous substances.
- Boscary, Jean Baptiste Marie, of Paris, for the extraction of a pyrogenous oil from various bituminous substances.
- Breguet, Nephew, and Co., of Paris, for a method of setting a watch which either gains or loses, by means of a sympathetic clock of a new description.
- De Braine, Francois Zozimo, and Kersselaers, for a new kind of paper called by them Sensitive.
- Barnard, William Henry, of London, for a new kind of dissolver hitherto unemployed in arts and manufactures.
- Reybaud, Brothers, and Co., of Marseille, for an improved refrigerator for condensing vapours in the process of distillation.
- Galy Cazalat, Antonie, of Versailles, for a steam carriage to be used on common roads.
- Pavy, Junior, and Co., for a new kind of tissue.

To David, Charles Abel, of Lyons, for a method of substituting paper to card boards in the Jacquart frames.

— Crozier, Joseph, of Lyons, for an improved thrashing machine.

— Moisson and Giret, of Rouen, for a new method of cleansing all cotton or woollen yarns or tissues.

— Mathieu and Sarrazin, of Paris, for an improved portable gas-making apparatus, by which a sufficient quantity of gas may be made for lighting private or public establishments.

— Brenot de Mellionas and Mouzin, of Dijon, for an improved pin-nail machine.

— Perrere, Huan, and Delrincourt, of Paris, for an improved kind of truss.

— Kachlin, Andre, of Mulhausen, for an apparatus for supplying hot air, and applicable to all fire-grates.

— Pelletan and Delabarre, of Paris, for a new method of creating a *vacuum* by the injection of high pressure steam.

— Lecomte, Eugene Louis Jean, of Paris, for improvements in the telegraph to be used by night and by day.

— MacCurdy, John, of London, for an apparatus to be used instead of the paddle wheels, and calculated to propel steam boats.

— Christophers, John, of London, for improvements on the construction of anchors.

## PATENTS FOR TEN YEARS.

— Delan Grenier, Pierri, of Paris, for an improved sweetmeat called by him *Nufé d'Arabia*, and made with the fruit of the *Khatmych*.

— Wertheimer, of Paris, for a new method of extracting from every kind of sea or river fish oils, ammonium and prussiate of potash.

— Spinney and Windzor, of London, for a new composition of materials to be employed in making retorts for the distillation of gas.

— Valson, Lorillard, and Chardot, of Nuits, for a machine for dressing flax and hemp.

To David Charles Abel, of Lyons, for a new method of engraving on metallic cylinders.

— Hamond and Renand de Vilbach, of Montpellier, for a new kind of steam carriage made to run on common roads.

— Nourry, Jean Chrysostome Hippolyte, of Courthezon, for a method of preventing the threads of silk from doubling and knotting when they are spun.

— Scrive and Boyer, of Lille, for series of machines calculated to spin up to the highest numbers the *hards* of flax or hemp

— Laforge, Vincent Narcisse Francois, for an apparatus which indicates the measure, the gravity, and degree of concentration of any kind of liquid.

— Sudds, Adkins, and Barker, of Rouen, for a press called by them a universal press, and applicable to the pressing of oleaginous seeds, and other purposes.

— Fournier de Lempdes, of Paris, for a new process and new instruments of *lithotripsy*.

— Levrat, Fleury, of Vienne, for a machine calculated to make rovings of, and spinning all kind of animal or vegetable fibres.

— Rodier, Denis, engineer, of Ganges, for a new method of spinning silk, whereby the loss incurred by the doubling and knotting of the threads is avoided.

— Canier, Felix, civil engineer, of Paris, for a pin-nail machine.

## PATENTS FOR FIVE YEARS.

— Huart, stove manufacturer, of Saintes, represented in Paris by Mr. Perpigna, for an improved apparatus to be used in the distilling of wine.

— Brisset, Pierre Denis, engineer, for improvements in lithographic presses.

— Sorel, Stanislas, watch-maker, for a method of regulating the combustion of fire, and maintaining almost a fixed temperature.

— Rosé, Pierre Guillaume, represented in Paris by Mr. Perpigna, for an improved cast-iron plough.

— Ducluzel and Doguet, father and son, of St. Etienne, represented in Paris by Mr. Perpigna, for an improved frame for making ribbons.

To Hood, John, of Gisors, for an improved spinning machine introduced from England.

— Jacquinet, Joseph Martin, of Paris, for an economical stove and fire-grate.

— Liantaud, Pierre Joseph, of Vaison, for an improved method of teaching to read music in sixty hours.

— Domi, Jean, of Wesserling, for an improved plough on the principle of suspension.

— Pitay, Hyacinthe, for an improved method of extracting pyroligneous acid by carbonising wood for animal substances.

— Chaber, Gustave, silk spinner, of St. Ambois, for an improved brush to extract the silk from the cocoon.

— Vivaux, Francois Eloi, of Paris, for a new method of heating the air used to stimulate fires in furnaces, stoves, &c.

— Petit, Jean Claude Adrien, of Paris, for a vase to be used in taking foot-baths, and called by him *thermopode*.

— Berliner, Arnault, of Strasbourg, for a new system of teaching to write.

— Faguer Labouillé, Jean Francois Hyacinthe, for a composition of a new paste called by him *amandine*.

— Herter, Jean Jacques Guillaume, of Strasbourg, for an improvement in window shutters, blinds, &c.

— Mesnager, Brothers, ribbon manufacturers, of St. Etienne, for an improved method of manufacturing silk ribbons.

— Beringer, Beatus, of Paris, for a new fire-arm to be used with or without powder.

— Lefetret and Serrurot, of Paris, for an improved kind of blacking called by them *hydrogenic*.

— Cezenas, Balay, of St. Etienne, for a new frame for making ribbons.

— Wetzels, Jean Guillaume Joseph, for an improved machinery applicable to pianos.

— Pertus, Joseph Isidore, instrument maker, for an improvement made on brass musical instruments.

— Stevenel, Henry, of Chalons, for a motive power driven by the action of a current of air.

To Bancel, Etienne, of St. Chamont, for ornamented tissues painted by hand.

— Marsais, Emile Nital Dieu Donné, of St. Etienne, for economical roasting-jacks.

— Sautier, Amé, of Paris, for improvements made in the manner of preparing the small plates of metal which are set under imitation stones.

— Chabert, Francois, of Nismes, for improvements in telegraphs.

— Roth, Brothers, and Dusau, of Saint-Geours-Marenne, for a method of extracting turpentine from the kind of pine which grows on sea-shores.

— Rongier, Pierre, of Moulins, for an instrument called by him *chiragraphe*, for teaching to write expeditiously.

— Pierres, Louis Ferdinand, of Paris, for wooden cradles and bedsteads which fold up on the principle of iron beds.

— Delon, Adolphe, for a machine called by him *ourdissoir-phœur par-fil*, for preparing the warp threads in tissues.

— Daveune, Louis, of Paris, for a new manner of converting iron into steel.

— Bled, Jean Francois, of Montdidier, for an improved method of teaching to read.

— Boivin, senior, of St. Etienne, for a batten adapted to a ribbon frame.

— Côte, George, of Lyons, for a new batten to be used in the making of all kind of ornamented tissues, and by which a single workman may use several shuttles and change the colours without stopping.

— Sellique, Alexandre Francois, of Paris, for an improved mill for grinding corn.

— Delimal, Augustin, of Amiens, for a new process of maceration applicable to the manufacturing of beet-root sugar.

— Goni, Emilaud, of St. Alban, for a new method of preparing gaseous waters and sparkling wines.

— Guanilh, Edouard, of Paris, for a new method of tinning copper and other vessels.

PATENTS FOR IMPROVEMENTS AND ADDITIONS MADE ON THEIR  
ORIGINAL SPECIFICATIONS BY THE PATENTEES THEMSELVES.

To Winter, Robert, represented in Paris by Mr. Perpigna, for improvements on his machine for washing linen.

— Delarue, Jean Baptiste Edouard, represented in Paris by Mr. Perpigna, for improvements on his spring syringe.

— Merckel, Etienne George, represented by Mr. Perpigna, for a fifth improvement on his patented matches and fire bottle.

— Brame, Chevalier Narcisse, of Lisle, represented in Paris by Mr. Perpigna, for a third improvement on his apparatus for boiling, evaporating, and concentrating syrups for the production of sugar, and also of saline liquors, or for the crystallisation of salt, which apparatus may also be employed in the process of distillation.

— Merckel, Etienne George, represented by Mr. Perpigna, for a sixth improvement on his patented matches and fire bottle.

— Louvrier, Louis Pierre Marie, to whom belongs Mr. Trappe's patent for improvements in the making of sugar, for further improvements on the same system.

— Meyer, George Henry, of Paris, for further improvements on his patented mattress.

— Richard and Gachet, of Lyons, for further improvements on their mechanical apparatus to be substituted to the Jacquot frames.

— Ingold, Pierre Frederic, watch maker, of Paris, for further improvements on his escapement with a constant power, and his compensating pendulum.

— Wayte, William, of London, for further improvements on his improved steam engines.

— Fozembas, Antoine, of Paris, for further improvements on his *electro-moteur*.

— Guibout and Samson, of Paris, for further improvements on their system of cleansing privies.

— Felissent, Emremond, of Lyons, for further improvements on his system of desiccation through the means of heated air.

To Alphonse, Giroux, and Co., of Paris, for further improvements on his philosophical instrument called *phenakistoscope*.

— Werly, Jean, of Bar-le-Duc, for further improvements on his tissues for making ladies' stays without seams.

— Maitre, Joseph, of Villotte-sur-Oura, for further improvements on his vertical flour mill.

— Hadengue, Toussant Remi, of Paris, for further improvements on his method of printing in relief on silk tissues.

— Giraud, Pierre, of St. Etienne, for further improvements on his machinery for making ribbons and tissues with raw silks.

— Fayard, Antoine, of Paris, for further improvements on his fringe called by him *clysobol*.

— Alleau, Simon, of St. Jean d'Angely, for further improvements on his distilling apparatus.

— Moisson, Isidore, of Lescure, near Rouen, for improvements on his method of cleansing all kind of woven or unwoven wools.

— Bourdeux, Adolphe, of Baïonne, for improvements on his method of preparing turpentine.

— Varlet, Francois Joseph, of Thionville, for improvements on his new stove.

— Varlet, Francois Joseph, for improvements on his method of manufacturing culinary utensils with sheet iron all of one piece.

— Boscary, Jean Baptiste Marie, for improvement on his method of extracting pyroligneous oils.

— Galy Cazalat, of Versailles, for improvements on his steam carriage which is to run on common roads.

— Toanne, Benigne, of Paris, for improvement on his new lamp called by him *astéare*.

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New Patents

S E A L E D I N E N G L A N D ,

1834.

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To Ernst Wolf, of Stamford-hill, in the county of Middlesex, merchant, for a certain improvement or certain improvements in steam engines, being a communication

from a foreigner residing abroad.—Sealed 26th April—6 months for enrolment.

To John Christophers, of New Broad-street, in the city of London, merchant, for his invention of an improvement or improvements on anchors.—Sealed 26th April—6 months for enrolment.

To William Gittins, of Saint Pancras, in the county of Middlesex, Esq., for his invention of an improved mode of applying the water used for the purpose of condensation in marine and certain other steam engines to the condenser.—Sealed 6th May—6 months for enrolment.

To William Alfred Noble, of Cross-street, Cherry Garden-street, Bermondsey, in the county of Surrey, engineer, for his invention of certain improvements in pumps, engines, machines, or apparatus, for drawing, raising, forcing, or propelling water and other fluids.—Sealed 6th May—6 months for enrolment.

To Alexander Beattie Shankland, of Egremont-place, in the parish of Saint Pancras, in the county of Middlesex, gentleman, for a machine or engine for cutting or fashioning wood into certain defined shapes or forms to fit the same more readily to various purposes and uses, being a communication from a foreigner residing abroad.—Sealed 6th May—6 months for enrolment.

To Louis Brunier, of Vineyard-walk, in the parish of Clerkenwell, in the county of Middlesex, architect and civil engineer, for his invention of an hydraulic machine or apparatus, of a centrifugal force, applicable to the raising or forcing water.—Sealed 8th May—6 months for enrolment.

John MacDowall, of Johnstone, near Paisley, in the county of Renfrew, Scotland, mechanic and engineer, for his invention of certain improvements on metallic pistons, pump buckets, and boiler steam engines.—Sealed 12th May—4 months for enrolment.

To James Dutton, of Wooton-under-Edge, in the county of Gloucester, clothier, for his invention of a certain improvement or improvements in dressing or finishing woollen cloths, and for the method or methods of and apparatus for effecting the same.—Sealed 13th May—a months for enrolment.

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## CELESTIAL PHENOMENA, FOR JUNE, 1834.

S.	H.	M.	D.	H.	M.
1			Clock after the ☽ 2 m. 37 s.	16	10 ☿ greatest hel. lat. N.
			☽ passes the mer. 20 h. 17 m.	14	1 2 ☽ in ☐ or first quarter
19	10	☽ sup. conj. with the ☽		17	46 ☽ in conj. with ☽ diff. of dec. 3. 0. 8.
9	2	22 ☽ in conj. with the ☽ diff. of dec. 3. 53 N.		15	Clock after the ☽ 2s.
8	9	☽ in Perihelion.		—	☽ passes the mer. 7 h. 18 m.
6	3	☽ in Perihelion.		16	20 ☿ in conj. with ☽ in Geminor. diff. of dec. 1. 29. N.
5		Clock after the ☽ 1 m. 59 s.		20	Clock before the ☽ 1 m. 2s.
		☽ passes the mer. 23 h. 19 m.		—	☽ passes the mer. 11h. 41 m.
		Mer. R. A. 5 h. 8 m. dec. 24. 6 N.		—	☽ eclipsed invisible.
				20	Ecliptic oppo. or ☽ full moon.
		Ven. R. A. 6 h. 32 m. dec. 24. 34. N.		21	11 12 ☽ enters Cancer.
				Occul. s in Sagitt. im. 10 h. 18 m. em. 11 h. 33 m.	
		Mars R. A. 1 h. 17 m. dec. 6. 46. N.		24	Occul. e in Cap. im. 12h. 29m. em. 18 h. 45 m.
				25	Clock before the ☽ 2 m. 6 s.
		Vesta R. A. 2 h. 12 m. dec. 7. 23. N.		—	☽ passes the mer. 16 h. 7 m.
					Mer. R. A. 7 h. 54 m. dec. 22. 32. N.
		Juno R. A. 19 h. 58 m. dec. 4. 17. S.		—	Ven. R. A. 8 h. 16 m. dec. 21. 31. N.
					Mars R. A. 2 h. 18 m. dec. 12. 5. N.
		Pallas R. A. 10 h. 0 m. dec. 12. 38. N.			Vesta R. A. 2 h. 43 m. dec. 9. 42. N.
					Juno R. A. 19 h. 49 m. dec. 3. 55. S.
		Ceres R. A. 10 h. 32 m. dec. 20. 35. N.			Pallas R. A. 10 h. 33 m. dec. 12. 41. N.
					Ceres R. A. 10 h. 56 m. dec. 17. 9. N.
		Jup. R. A. 3 h. 30 m. dec. 18. 11. N.			Jup. R. A. 3 h. 49 m. dec. 19. 12. N.
					Sat. R. A. 12 h. 20 m. dec. 0. 83. N.
		Sat. R. A. 12 h. 19 m. dec. 0. 44. N.			Georg. R. A. 21 h. 55 m. dec. 13. 27. S.
					☽ passes the mer. 1 h. 41 m.
		Georg. R. A. 21 h. 56 m. dec. 13. 22. S.			☽ passes the mer. 2 h. 4 m.
					☽ passes the mer. 19 h. 59 m.
		☽ passes the mer. 0 h. 47 m.			☽ passes the mer. 21 h. 33 m.
		☽ passes the mer. 1 h. 39 m.		2	50 ☽ in conj. with ☽ diff. of dec. 3. 58. N.
		☽ passes the mer. 20 h. 23 m.		23	44 ☽ in quadrature with the ☽
		☽ passes the mer. 22 h. 34 m.		26	3 58 ☿ greatest hel. lat. N.
6	27	☽ in conj. with ☽ diff. of dec. 2. 4. N.		28	13 57 ☽ in ☐ or last quarter.
8		☽ in conj. with ☽ in Geminor. diff. of dec. 0. 44. N.			
6		☽ eclipsed invisible.			
5	9	☽ stationary.			
21	56	Ecliptic conj. or ☽ new moon.			
7	11	9 ☽ in conj. with ☽ diff. of dec. 1. 46. N.			
8	21	35 ☽ in conj. with ☽ diff. of dec. 0. 1. N.			
10		Clock after the ☽ 1 m. 4 s.			
		☽ passes the mer. 9 h. 50 m.			
12	5	☽ in conj. with ☽ in Geminor. diff. of dec. 1. 43. S.			

## METEOROLOGICAL JOURNAL,

FOR APRIL AND MAY, 1834.

1834.	Thermo.		Barometer.		Rain in in- ches.	1834.	Thermo.		Barometer.		Rain in in- ches.
	Hig.	Low.	Hig.	Low.			Hig.	Low.	Hig.	Low.	
<b>April.</b>											
26	56	37	30,03	29,85			11	68	49	29,85	29,79
27	53	40	29,60	29,30			12	63	51	29,70	29,63
28	60	41	29,35	29,31	,025		13	63	49	29,60	29,59 ,15
29	64	46	29,49	29,43	,1		14	65	41	29,77	29,63 ,375
30	65	45	29,54	29,46	,225		15	70	51	29,83	29,78 ,1
<b>May.</b>											
1	65	47	29,65	29,60	,05		16	66	49	29,70	29,61
2	67	48	29,69	29,67			17	64	46	29,47	29,36
3	67	47	29,78	29,72			18	62	40	29,40	29,37 ,025
4	69	47	29,89	29,83			19	65	37	29,83	29,65 ,15
5	65	45	29,96	29,91	,125		20	70	39	30,21	30,04
6	66	49	30,24	30,05	,3		21	69	36	30,38	30,35
7	71	47	30,81	30,26			22	67	43	30,38	30,27
8	75	50	30,19	30,14			23	70	45	30,24	30,23
9	70	42	30,07	30,01			24	72	41	30,29	30,25
10	70	46	29,96	29,92			25	71	40	30,29	30,24

Edmonton.

CHARLES HENRY ADAMS

Latitude 51° 27' 32" N.  
 Longitude 3° 51' West of Greenwich

THE  
**London**  
**JOURNAL OF ARTS AND SCIENCES,**  
AND  
**REPERTORY**  
OF  
**PATENT INVENTIONS.**

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*CONJOINED SERIES.*

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No. XXVII.

**Recent Patents.**

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*To THOMAS AFFLECK, of the town of Dumfries, in the county of Dumfries, Scotland, merchant, for his invention of certain improvements in the means and machinery for deepening and excavating the beds of rivers, removing sandbanks, bars, and other obstructions to navigation.—*  
[Sealed 11th December, 1833.]

WE have several times mentioned the invention which forms the subject of this patent, as having been partially put into operation in Scotland upon a limited scale, but with perfect success. We have now the pleasure of laying before our readers the details of the plan and apparatus proposed by the Patentee to be employed for effecting these desirable objects.

It is scarcely possible to conceive a subject of greater national importance than that of obtaining a simple and effective means of removing sandbanks and bars which have formed upon our shores, particularly from the mouths of rivers and harbours, a subject involving the safety of life and property to such a vast extent, and the continual sacrifice of which forms such an appalling feature in our public annals. Yet simple and effective as the proposed plans appear to be, and with all the importance which attaches to a successful result, we hear but of one port (we believe Yarmouth) in which the subject, though forcibly urged, has been deemed of sufficient interest to rouse the intellectual energies of the corporation into an inquiry as to its practicability and probable success. We are led from our usual course of simple detail into these incidental, we hope not extraneous, remarks, from an anxious desire to attract the attention of those who, through civic jurisdiction and local influence, may, by promptitude or supineness, promote or impede the prosecution of any attempt to effect the removal of such dangerous obstructions to navigation. The subject is one that may be brought much nearer home to many of us than we may anticipate. At all events, it should be remembered that national interest is individual interest upon an extended scale.

Our limits will not allow us to say more at present; we may on a future occasion advert again to the subject, which, indeed, is highly deserving of consideration; but we proceed to the explanation and details of the invention.

“ This invention of certain improvements in the means and machinery for deepening and excavating the beds of rivers, removing sandbanks, bars, and other obstructions to navigation, consists in directing the natural current of running waters to certain points or parts of the shallows, by

means of apparatus and machinery which are intended to produce checks or obstructions to the course of the stream, and thereby cause such pressure and agitation of the waters at the desired points as shall be sufficient to disturb and wash away the sand, mud, and other matters that have been deposited in the way of the required channel.

“ These effects I produce by the employment of various apparatus, both fixed and moveable, which I am about to describe; and also to point out the situations to which they are respectively adapted. But it would be impossible to contemplate the local peculiarities of every situation wherein my mode of operating might be beneficially applied. I shall therefore proceed to describe only certain situations, and the apparatus and mode of proceeding which I should employ under the respective circumstances.

“ Supposing the mouth of a tide river, wherein the current runs principally on one side, a low sandbank lying on the other side, which is generally the case in a wide part of the river, and on the inner or lesser curve of every bend, the shallow occupying a very considerable portion of the breadth. If this bank is below the level of the half-flood spring tide, then a portion of the current of the water will cross the low part of the bank and the line of the low water channel; and before the half-flood takes place, and after half ebb, the sandbank becomes the conductor of the current into an erroneous course, the smooth nature of that conductor, its line of direction, and the descending plain from the bank, causing the water to rush forward and to act forcibly upon the next object that it meets with.

“ From this cause it generally happens that the mud and other matter disturbed by the force of the water are those lying at the outer part of the curve, which, following the water in its circular eddy, produces a deposit on the low part of the bank on the opposite side of the channel,

and by that means the bank becomes extended, and more influential in conducting the current farther from its proper course. In order to remove such obstruction to the course of the stream, I should first employ a stationary apparatus, which I fix upon the bank or bed of the river, in such a situation as might not be objectionable or likely to obstruct the navigation.

"This apparatus consists of a series of piles driven deep into the sand or mud, in a row, forming a line across the point of the jutting-out part of the bank, which piles may be connected together at top by timbers, as Plate XIII, fig. 1. The current and waves being impeded and directed by meeting with this obstruction, will, by their pressure and force, wash a deep furrow in the bank at the obstructed part, and this furrow will become the channel of the leading current, as is invariably found to be the case in all deep parts of a running stream. On sandy bottoms, over which the currents are great both in quantity and speed, the top rails of timber should at first be so fixed to the piles that their upper parts stand only a little above the surface of the bank, as the danger to be apprehended from too great a resistance is, that such an excavation might be made at once as would cause the force of the current suddenly to undermine the erection. The top of the timber should, therefore, be low in the first instance; and as the excavation goes on, the piles should be driven in deeper, and more timber be bolted on the top of the pile, as the channel in the bank becomes washed out. But loose sandbanks sometimes rise in situations where stationary piles and timbers cannot be conveniently placed; in such situations an apparatus may be adapted to be anchored on the point of the bank, in order to be brought into operation as close to the bank as possible.

"Fig. 2, represents a section taken across a river, the

channel of deep water being on one side, and the other side being filled up with a bank of sand or mud. In this instance it is intended to obstruct the water to a considerable depth or height from the bed. The simplest contrivance to effect this would be to lower the hull of a vessel deeply into the water, to the sides of which vessel a framework of timber has been attached by bolts, and bound together by any convenient means ; this framing of timber being so attached as to stand at nearly right angles to the keel. This apparatus having been thus partially sunk into the water, will cause a considerable obstruction to the stream, and in so doing create a violent scour against the bank beneath, and for some distance round the spot where it is placed, dispersing the mud and sand in the running water, which by the current will be carried away.

" In order to avoid the inconvenience that might occasionally arise from vessels requiring a free water way to pass, as well as to enable the machine to be dragged against the current, I would, under some circumstances, connect the wings of timber to the hull of the vessel by hinge joints, so as to fold up close alongside, either towards the stem or stern, as might be required.

" The bracings necessary for keeping these framings of timber suspended at right angles with the keel, may be ropes, iron bars, or chains ; and the segment of a toothed rack might be fixed to the top of each framing of timber, for the purpose of opening it out or bringing it alongside, by means of a pinion or endless screw mounted on board the vessel. The apparatus for taking the wings or framings in, and forcing them out upon their joints, must be proportioned to the weight and strength of the framing, and to the quantity and speed of the current.

" As the force of the combined current would cause the bank against which it is applied to be rapidly washed away,

I should so regulate the hold of the anchor against the bottom as to allow the vessel with its wings to drift with the current by slow degrees, in order to bring the scouring operation progressively to act upon an extended portion of the bank. This may be done by employing a powerful crane on the deck of the vessel to raise or lower the fluke of the anchor, so as to enable it to hold on or slack away, as the nature of the work requires; and the anchor may be so constructed as to drag the gravel and stones from the shallows into the deep parts of the river as it advances. This method of deepening or widening a river may be employed to any extent of power, even so great as to force the whole flood and ebb of a river into the half of its regular space, and with such power mud, sand, and even gravel, would move along with the same rapidity as the pure water. Several machines of the simple construction described might be applied in a range across a river, having the means of resisting or holding on so regulated as to allow the slow drifting of the apparatus with the current.

" The hold of the vessel must be loaded in order to sink it to the proper draft of water; and the depth of the current being changeable as the tide rises and falls, the vessel must be buoyed and regulated, so as to allow the bottom current to continue to act uniformly with the most efficient force, which can only be determined from observation during the operation of the work. This regulating of the depth of the apparatus may be done by dividing the inside of the hold into water-tight chambers or cisterns, each of which cisterns or chambers has a valve or spigot to admit water, and a pump to expel it, or pumps may be employed capable of either injecting or expelling the water. These cisterns are necessary in order to prevent the water from rushing to either side or end of the

vessel suddenly, and to keep the vessel upright, as well as, by filling or emptying some of the tanks, to sink her down or raise her up to any required state of buoyancy.

“ Another variety of the apparatus is shown in two different views at figs. 3 and 4, consisting of a cross of timber held together, and weighted by a strong cast-iron central plate. The cross may be constructed of various dimensions, from twenty to fifty yards expanse, and of twenty or thirty inches deep, having iron feet which take hold of the sand. The cross is held on by an anchor and chain cable, and the points are prevented from penetrating too deeply into the sand by shoulders or other broad surfaces. The timbers thus sunk into the water interrupt the courses of the current at bottom, and produce a scour or washing out of the bed or bank beneath ; and as the sand or mud gives way, the cross drifts slowly with the current to the extent of the moving chain, in one direction with the flood, and in the opposite direction with the ebb tide. I prefer a cross framing, as shown, but nearly the same effect might be produced by a framing of three, five, or any greater number of arms, and a buoy should be attached to the centre, in order to point out its situation. Under some circumstances I might make the framing of logs of timbers, properly braced, of sufficient height to stop the whole depth of the current in which it is immersed, and, in that case, should construct a large tank in the centre for the purpose of loading or unloading the apparatus, as might be required ; and in this tank I should construct a cabin for affording shelter to the workmen employed.

“ Having described the general features of my plan of proceeding, it will be clearly understood that my invention consists in partially confining and restraining the currents of running waters, so as to bring an extraordinary force

or pressure of the water, to act upon certain parts of the bank or bottom desired to be removed, by means of which force the sand or mud is removed, and new and deep channels produced, without the labour and expense of dredging. As, however, various localities and circumstances may render the employment of various constructions of apparatus more or less eligible, it may be desirable for me to show the several kinds of apparatus which I have found useful in the course of my practice, without intending to confine myself to the use of these alone.

"Fig. 5, represents one of a series of stakes or piles having a great depth of hold in the bottom. Such, in many situations, will produce, by the action of the waves and currents, a deep unchanging channel; the height and distance of the piles apart to be regulated by circumstances.

"Fig. 6, is another construction of pile, having a socket fixed to the upper part of the pile-rod, in which is inserted a block of timber. A series of these piles are to be placed in a row along the middle of the intended channel, when the bulk of the wood will check the current and produce the scouring, as before explained.

"Another contrivance is shown at fig. 7, which is a line of flap-gates or sluices, suspended on long piles fixed into the ground, the hinges being at top. These are intended to be placed across a tide way, to produce a deep river channel through an obstructing bank. The ebb of the tide will cause an excavation on one side of the range of piles, and the flow of the tide on the other side. Sometimes the flap-gate may occupy the whole space between the piles; but in very exposed situations the flaps should be open at the upper part to allow a portion of the wave to pass over. These may, in some situations, require to be prevented from opening beyond a certain extent, in which cases the lower part of the gate must be secured by a

chain to the piling. Fig. 8, is a line of piling for keeping a stream from shifting its place. It must be strong enough to resist the impulse of the greatest waves and currents by which it can be reached, but should not be placed in the way of any vessels. A portable apparatus, formed like fig. 1, to be placed in sections, may be set in any situations in the line and crossing the line of the water way, to prevent the accumulation of sand in the way of a required channel. As it is often necessary to preserve the breadth as well as the depth of a water way, I should, in some such cases, construct an apparatus as shown in the plan (fig. 9). Supposing one side of the plan to represent a wharf or quay, I should erect swinging frames or wings of timber, to obstruct the current, upon upright joints or hinges affixed to the breast of the wharf, or driven firmly into the ground. These wings may be allowed to open outwards across the current by the fall of the tide, and to close in and lay flat against the breast of the quay on the rising of the tide. The extent to which the wings shall open, may be determined by stops driven into the bed of the river or harbour, or by check chains. Frames of a similar construction might be made to turn upon a central axle, consisting of a rod of iron driven firmly into the bed of the river, as shown in the last-mentioned figure. These frames might be made to stand as obstructions to the course of the stream, either across or at any oblique angle, for the purpose of directing the current against any sand or mud bank, and they might be adapted to turn and lie in the direction of the stream during the time the tide is rising.

“ Fig. 10, is a timber log, to be held as an obstruction to the current, by short chains connected to piles driven into the ground. This log may have iron teeth on its under side to dig into the bed of the river and disturb the bottom,

while the current carries off the substance raised. A series of logs of this kind might be held by means of anchorage, as at fig. 11 ; and if empty casks were affixed to the upper side of the beam or log, the motion of the waves would cause the points to peck the ground continually. Fig. 12, represents a series of these logs or beams placed at certain distances apart, extending across a river in the middle of the stream, and connected together by mooring-chains attached to their ends, or by any other convenient means. This apparatus, by the obstruction it would present to the flow of the current, would cause the water to wash out the bed of the river to a considerable depth during the run of one land flood. When there is no flood in the river, the chain on one side might be let go, which would allow all the beams to fall into a line on the side of the river ; and when the flood came, this mooring-chain being again made fast on the opposite side of the river, the other chain might be slackened down, and the beams brought across the current, as represented. In order to carry the operation along a considerable extent of the river, the mooring chain might be at intervals progressively slackened down, a few inches at a time, during the whole run of the flood, and, by that means, be made to dig up and wash away the complete bed of the river to a considerable extent at one flood. This application is most suitable for clay bottoms, particularly stiff clay ; but, by continued action in several floods, gravel and even stones might be disturbed and washed out by the force of the water.

“ Fig. 13, represents a line of agitators, consisting of short staves of wood, sheathed or pointed with iron, severally passed through the link of a strong chain. The alternate staves cross each other, and one of the ends of each stave bears upon the ground. One end of the chain is secured by an anchor or mooring block, and the other

end is attached to a floating buoy. The ends of the bars, thus arranged by the agitation of the water, are made to peck into the ground, and thereby to disturb the bottom, which, being loosened, is washed away by the force of the current. Fig. 14, is a floating beam, intended to direct the current downwards ; it is held in its place by a mooring block and chain, and the length of the arm extending below determines the proper angle at which it should float to produce the required resistance to the flow of the water.

“ Fig. 15, is a cross frame of timber, on which is constructed perpendicular rods or bars, pointed at bottom. These are held by beaming, which is floated to any part and fixed in the bed of the river by a central pile, screwed or let firmly into the ground ; and as the current of water flows between them, they are subject to such vibratory action, as cause their points to bore into and break up the hard surface. The central pile must be occasionally driven further into the ground, in order to keep the points of the rods in operative situations.

“ Another apparatus for breaking up the bed of a river, when formed of hard materials, may be constructed as fig. 16, which is a sort of porcupine roller. A beam of wood, as an axle, carries a considerable number of radial arms or rods, securely braced together and pointed at their outer extremities. This roller being placed in the middle of a river, or in any situation where the bottom is required to be deepened, may be made to roll over along the bed by the labour of horses upon the banks upon each side, or by any other power connected by chains or ropes to the ends of the axle. The effect of this apparatus would be, that the points of the rods by their vibration would break up the ground, and resistance opposed to the current would cause these loose materials to be washed away.

“ Figs. 17, and 18, are an elevation and plan of a wedge-formed apparatus, embodying most of the features de-

scribed in the foregoing figures. It is intended to be placed in a running stream, so as to receive the current at its wide open part, and, by confining it, to cause such a rapid and powerful discharge of water below as shall carry away the mud, sand, or other deposit which formed the bank. The apparatus is constructed of timber on the sides, with perpendicular rods of iron, taking hold of the ground, and is secured in its place by the anchors. The current flowing in at the open part, becomes restrained and confined by the inclined sides, and is thereby made to gush out with great force at the under part, carrying the sand, mud, and other materials with it. Casks are attached by transverse beams, in order to render the whole buoyant in case of accident.

“ This is a very safe apparatus for exposed situations. One of these, constructed of American yellow fir, was moved about at work in an arm of the Solway, in very stormy weather, and was every day in situations where destruction would have been unavoidable to any sailing vessel. The power of a land flood in any river is so great with this apparatus, that it would be certain to clear out and equalise the depth of the channel to a considerable extent in a few hours.

“ In order to clear away an accumulation of the sand and mud from the sides of a pier or jetty, supposing such erection to be formed of timber, as fig. 19, I should enclose its sides by shutters, opening inwards, which would allow the waves as they rise to pass to the interior, and being there confined, and prevented from returning, by the closing of the shutters, the pressure of the confined water would gush out at the bottom of the erection, and carry away with it all the mud, sand, or other materials which had been deposited. The interior of the wooden pier or jetty should be divided into compartments, to produce the best effect, when each wave, by opening the flap or shutter inwards,

would be enclosed above the level of the still water, and having no other escape, would, by its pressure, force out the materials from below, and thereby clean away the obstruction. The same thing is applicable to the front of a stone quay or breast, and may be constructed by temporary piles, driven into the ground, a few feet from the face of the pier.

"Having described various apparatus and modes of working, applicable to my improved method of removing banks of sand or mud, I may add, by way of conclusion, that the leading object of my invention being to direct strong downward currents of water against the bottom or bed of a water course, it might be desirable, under some circumstances, to employ pumps, driven by a powerful steam-engine, which should be capable of forcing water in jets against the bottom to effect the same object.

"Lastly, I have to repeat, that it would be impossible for me to point out every variation of implements, apparatus, or machinery, which local circumstances might render convenient and applicable to the purposes of deepening and excavating the beds of rivers, removing sandbanks, bars, and other obstructions to navigation. I therefore desire it to be understood, that my invention consists in directing, impeding, confining, and restraining the currents of running waters, in the ways above described, for the purpose of causing the pressure or rushing force of such confined streams to act with increased power upon certain parts of the banks, beds, and shallows, and, by so acting, to excavate and wash away the said obstruction, and to form thereby, new, deep, and capacious channels for the free course of the stream, in which channels vessels of considerable burden may be navigable with ease and perfect safety."—[*Enrolled in the Rolls Chapel Office, April, 1834.*]

Specification drawn by Messrs. Newton and Berry.

**To WILLIAM AINSWORTH JUMP, of Marston, in the county of Chester, gentleman, for his invention of certain improvements in drawing or extracting salt from salt pans.—[Sealed 14th October, 1831.]**

“ IN making or manufacturing salt, it is the practice of the salt-waller or boiler to draw the salt from the pan by raking it to the sides, and then removing the salt by means of a skimmer or perforated shovel. This operation of raking the salt to the sides of the pan is not continually performed, but only from time to time when the salt is to be removed from the pan ; consequently, the salt, as it crystallises, falls to the bottom of the pan, and tends to prevent the heat from the furnaces or fires coming directly to act on the brine, such heat having first to pass through the layer of salt on the bottom of the pan, by which not only much of the heat is lost, but, at the same time, the action of the heat on the metal causes what is called ‘pan-scratch’ or ‘pan-scale,’ to form on the upper surface of the pan, and then the continuation of the action of the heat quickly destroys the metal. Now, my invention is the continually raking of the salt towards the sides of the pan, and into pockets or recesses formed to receive it ; thereby, in some degree, preventing the formation of pan-scratch or pan-scale. But the principal object of such invention is, the being able to extract the salt from a pan covered, so as to preserve the steam produced from the brine, for the purpose of heating other salt pans.

“ I perform this operation by means of an arrangement of apparatus or machinery hereafter described ; and which arrangement of apparatus constitutes my invention, and consists of revolving rakes, set at an angle, whereby the salt is continually raked towards the sides of the pan, till it falls into recesses formed to receive it.”

Plate XIV, fig. 11, represents the plan of a circular salt pan, having in the sides two recesses formed to receive the salt; or there may be formed a recess all round for the same purpose: from these recesses the salt is to be removed by hand, as heretofore.

Fig. 12, is a vertical section of the salt pan, taken through the centre: *a, a*, the pan; *b, b*, the pockets or recesses to receive the salt as it is raked from the centre of the pan to the sides. The pan is set in brickwork, having a furnace below, as usual.

The Patentee does not confine himself to the use of a naked fire for the purpose of heating the brine in the pan, but intends to avail himself of other well known means of heating the brine, such, for instance, as steam. But as the invention only relates to the means of raking the salt towards the sides of the pan, for the purpose of drawing or extracting the same therefrom, it is not conceived necessary to be more particular in describing the means of heating the brine, they being well understood.

An upright shaft *e*, receives motion, which is imparted by any well known mechanical means. On the upper part of the shaft *e*, there is placed an arm *l*. This arm *l*, carries the several scrapers *n*, the handles of which are affixed in the swinging frames *o*, in the following manner:—

On the handles of each of the rakes *n*, there is formed a hook *p*, which hook into holes formed into the swinging frames *o*, as shown in the detached fig. 13, upon a larger scale.

In order to keep the rakes to their intended positions, the handles pass through eyes *r*, also formed in the swinging frames *o*, by which means the rakes, by their own weight, keep to the bottom of the pan, and accommodate themselves, in a certain degree, to the warping or deviation from the level, which generally takes place in the bottoms

of salt pans after being some time in use. As these rakes are placed obliquely, and are caused to travel round the pan by the slow turning of the shaft *e*, they continue to rake the salt from the centre of the pan towards the sides. That rake which is nearest to the centre, drives off the salt which lies in its track towards the sides of the pan, and forces it into the track of the next scraper succeeding, and that into the track of the next, and so on, and ultimately into the recess *b*, *b*. Thus is the bottom of the pan continually cleared from salt, and the heat comes immediately to act on the brine. Four rakes only are shown; but it will be understood that more or less may be used without departing from the principle of the invention.

The shaft *e*, is protected from the action of the fire by a wall of brickwork. The cover of the pan *s*, is inserted into the water-lute-joint *v*, and is suspended by a counterpoise, so as to be easily raised or lowered for the purpose of skimming or clarifying the brine, changing the scraper when clogged with salt, or any other necessary purposes; *w*, is the pipe for conveying the steam under another salt pan.

The specification concludes by saying, "Having now described the nature of my invention, and the manner in which the same is to be performed, I would have it understood, that I claim as my invention an arrangement of revolving rakes in salt pans, such rakes being set at an angle to a line drawn through the centre of the pan, whereby their revolving will continue to rake the salt outwards from the centre to the sides of the pan, in the manner] above described."—[*Enrolled in the Enrollment Office, April, 1832.*]

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*To THOMAS SUNDERLAND, of Blackheath, in the county of Kent, Esq., for his invention of certain improvements in propelling vessels.—[Sealed 19th December, 1833.]*

THESE improvements in propelling vessels consist in the employment of certain novel constructions and arrangements of machinery capable of giving locomotion to ships, boats, and other vessels on water: which novel arrangements of machinery may be described generally under two heads; first, in the adaptation of a peculiar construction of reciprocating paddles; and, secondly, in the adaptation of a peculiar construction of rotary paddles.

In the accompanying drawings, see Plate XIV, fig. 1, represents the longitudinal section of a vessel with a reciprocating paddle applied at the head, and another at the stern. These paddles are attached to longitudinal sliding bars, and are intended to be moved fore and aft by means of rotary cranks, to which the sliding bars are connected, or they may be actuated by any other convenient means. Fig. 2, is a plan or horizontal view of the same, showing the cranks, which may be driven by the ordinary mechanism of a steam engine or other first mover. One of these paddles is represented detached, and upon an enlarged scale, in the front view, fig. 3, and edgewise in figs. 4 and 5. The paddles are formed by broad plates or boards *a, a, a*, each being suspended by a hinge joint *b*, from the arms of the frame *c, c, c*. The upper part of this frame is attached to a tube *d*, which forms a portion or elongation of the longitudinal sliding bar before mentioned. The end of this bar *d*, is made tubular for the purpose of receiving a rod *e*, which is enabled to slide within it; but when the paddle is in operation, they are locked firmly together by a wedge *i*. This wedge *i*, turns upon a pivot fixed in the rod *e*, and fits into a slit cut in the upper part

of the tube *d*. A piece *f*, with two arms *g* and *h*; designed to form stops to the swinging paddle *a*, is made fast to the rod *e*, and is enabled to slide with it by means of a slit cut in the under part of the tube *d*. This stop piece *f*, with the rod *e*, being fixed by means of the wedge *i*, as shown at fig. 1, the longitudinal bar *d*, in moving inward, will cause the paddle to be brought up into the perpendicular position against the arm *g*, and by thus presenting its broad surface to the water, will cause the vessel to be propelled in the opposite direction; but on the paddle *a*, returning through the water, it will be enabled to swing back into the horizontal position, as shown by dots, the part *h*, of the stop passing through a hole in the middle of the paddle seen in the front view, fig. 3.

If on a sudden it should be necessary to arrest the progress of the vessel, or to give the vessel a retrograde movement, that may be effected by turning the wedge *i*, round upon its pivot, and at the same time sliding back the rod *e*, and locking it by the wedge *i*, as at fig. 5; then by giving the paddle a reciprocating action as before, the force of the paddle will be brought up against the stop *h*, and the vessel will be propelled in the reverse direction.

It must be obvious that several of these paddles may be applied both at the head and at the stern of the vessel; and being respectively attached to cranks upon the main rotary axle, will be moved to and fro, and operate in the way described.

The whole of this machinery may be adapted to work below the surface of the water by simply lowering its position, and dispensing with the arms *c*, *c*, *c*, *c*, of the paddle frames, as represented in figs. 6 and 7. The bars *d*, must, under these circumstances, pass through stuffing boxes or packings at the head and stern of the vessel, in order to prevent the water from entering.

The improved rotary paddles, which constitute the second feature of the invention, are designed to enter the water edgewise, to perform the propelling stroke in positions radial to the centre of the axle, and to leave the water edgewise.

The manner in which these objects are effected, will be perceived by reference to the following figures of the drawings. Fig. 8, is a vertical section of one construction of paddle wheel; *a, a, a*, are the radial arms attached at their outer extremities to rims or wheels *b, b*. A series of paddles *c, c, c*, are connected to the radial arms by pivots or axles at *d*, upon which pivots they are enabled to turn. To each of these paddles a crank or small lever is affixed, which, by a joint, is connected to a rod *e*. The reverse end of each of these rods is formed with an eye that embraces and turns upon the axle of a roller *f*, which is carried round within the groove *g, g, g*, made fast to the side of the vessel. Another rod *h*, is in a similar manner connected to the axle of the roller at one end, and at the reverse end turns upon a pivot *i*, fixed in the next radial arm of the wheel. It will hence be perceived that as the arms *a*, revolve, the rollers *f*, will be carried round the groove *g, g*, holding the paddles in the positions represented in fig. 8, that is, at right angles to the arms *a*, until on the rollers *f*, respectively arriving at *k*, the smaller radius of the groove, they will then, by being brought nearer to the axle of the wheel, draw the rods *e*, and cause them to turn the paddles into radial positions, which the paddles will respectively retain while they are making the propelling stroke; and then having arrived at the other extremity of the smaller radius of the groove at *l*, the rollers will shift the paddles into the position first described. Thus the paddles respectively will be made to enter into and pass out of the water

edgewise, and perform their propelling strokes through the water in radial positions. It may be necessary here to observe, that corresponding grooves and rollers are to be placed on both sides of the wheel in order to afford parallel guides to the paddles.

I sometimes construct my rotary paddles in such a way, that they may be enabled to turn upon axles placed in radial directions in the wheels. Fig. 9, is a vertical section of a propelling wheel upon this construction ; and fig. 10, is an edge view of the same, in which only three paddles and their cranks and rods are represented : *a, a*, are the radial arms, the outer extremities of which are made fast to the rim or wheel *b*. The paddles *c*, turn upon axles mounted in transverse bars *d, d*. To these paddles, and also to the axles of the rollers *f*, cranks and jointed rods *e, e*, and *h*, are connected ; the fulcrums of the cranks and rods *e*, are pivots or axles turning in the rims of the wheels at *i* ; and the fulcrums of the rods *h*, are pivots or axles turning in the radial arms of the wheels at *j*.

The movements of these paddles are effected in a similar way to those already described in reference to fig. 8 ; but by the manner in which the paddles are mounted, it will be seen that immediately after entering the water they will be turned from the positions in which they stand, parallel to the face of the wheel, into positions coinciding with the direction of the axle of the wheel, and will then perform the propelling stroke, after which they will respectively turn into their former positions, and pass out of the water edgewise, and will thereby present no resistance to the progress of the vessel.

Lastly, having described the construction of my improvements in propelling vessels, I wish it to be understood that my particular claim of invention consists in the adap-

tation and arrangement of the reciprocating paddles, and also in the peculiar construction and mode of turning or feathering the paddles of a propelling wheel, as above described.—[*Inrolled in the Rolls Chapel Office, June, 1834.*]

Specification drawn by Messrs. Newton and Berry.

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*To JEAN JACQUES JEQUIER, of Castle-street, Leicester-square, in the county of Middlesex, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in machinery for making paper, which he denominates Xeranothlipse.—[Sealed 31st August, 1831.]*

THIS invention is designed for the purpose of making paper with wire water marks in a machine, that effect having only been attained heretofore by the employment of hand moulds.

This machine is constructed in the same way as other machines for making perpetual lengths of paper upon Fourdrinier's principle; having ribs or thick wires placed longitudinally in the wire web or endless mould upon which the paper is formed, the improvement consisting simply in the introduction of a felted pressing roller, acting upon the paper after it has been discharged from the mould.

The Patentee states, that by means of longitudinal thick wires, formed in the web mould, the lines or lay upon paper have been before attempted to be made; but that in passing the paper between pressing rollers in order to discharge the water, the thick wires have caused the paper to be separated into strips.

The description of this machine is very obscurely made out in the specification, but we will endeavour to explain

its construction and mode of operating. Plate XIII, fig. 20, is a longitudinal section of the machine; *a, a, a*, is the endless web, made of wire gauze, with the thick wires fixed thereon longitudinally, which are to produce the lay lines. This wire web is extended over the two cylinders or drums *b, b*; and on the upper surface of the web the paper pulp is made to flow in the usual way, the web receiving a lateral movement for the purpose of spreading the pulp evenly, and shaking the water from it; which movement is effected by the same means as are ordinarily resorted to in paper-making machines.

An endless felt or cloth *c, c, c*, is extended over the rollers *d, d*, on to which felt or cloth the sheet of paper is delivered from the wire web to be what is termed couched, that is, squeezed, for the purpose of expressing the water. The roller *e*, however, by which the pressure is produced, is covered with felts, in order to render it soft and elastic. A trough is placed below this roller to catch the draining water.

The endless felt carries the paper in the direction of the arrow, apparently at the under side, to the roller *f*; but there appears to be some deficiency in the description as to the mode of supporting the paper, which we cannot satisfactorily clear up. The paper, however, quits the felt at the roller *f*, and passes between it and the upper pressing roller *g*, to the reel *h*, or it may be to the drying cylinder and cutting apparatus, if such be attached to the machine.

The specification concludes in these words: "Having now described the nature of this invention, and the manner in which the same is to be carried into effect, I would have it understood that I lay no claim to the various parts separately of which this machine is composed, neither do I claim the application of large wires to the end-

less wire cloth to produce the water marks lengthwise of the paper, that having been known before; but I claim as the invention communicated to me from abroad, the combination and arrangement of the parts from the point at which the paper leaves the endless wire cloth till it arrives at the reel, whereon the paper is wound in the usual manner of making paper by machinery; and such combination and arrangement of parts is particularly adapted to the couching and pressing of lengths of paper made on an endless wire cloth, such wire cloth having large wires lengthwise, as above described. And as the principal part of the pressure for driving out the water and pressing the paper does not take place till such paper leaves the wire cloth on which it is first formed, consequently such paper will not be liable to be divided by the longitudinal wires, which would be the case if the wire cloth were to pass with the paper through the pressing rollers in the machines now employed.—[*Inrolled in the Inrolment Office, February, 1832.*]

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*To WILLIAM HUBIE, of the city of York, joiner and cabinet-maker, for his having invented an improved mangle.*  
—[Sealed 2d June, 1832.]

THIS mangle consists of three rollers, placed one above the other in a vertical frame or standard, the axle of the upper roller being pressed upon or weighted by a powerful spring. The articles intended to be mangled are introduced into the machine by passing them under the middle roller, which is made to revolve by a pinion upon the axle of a fly wheel taking into a large toothed wheel fixed to the axle of the middle roller, the fly wheel axle being driven by a winch, or by any other means.

Plate XIV, fig. 14, is a front elevation of the mangle; *a*, is a large cylindrical roller, turning upon an axle, the pivots of which bear in the side frame or standards. This roller may be considered as the bed of the mangle. The middle roller *b*, is of small diameter; it turns upon its axle in slots in the side frame, and bears upon the bed roller. The pressing roller is at *c*, the axle of which turns likewise in the side standards; and this roller bears upon the smaller or middle roller *b*.

In order to afford such a degree of pressure as might be found necessary to produce the effect of mangling upon the linen and other articles to be operated upon, two blocks of wood *d*, *d*, are made to bear upon the ends of the axle of the upper roller, which blocks are pressed upon by the ends of a powerful spring *e*, affixed to the upper rail of the frame.

A toothed wheel *f*, is fixed upon the end of the axle of the middle roller *b*, which is driven by a pinion *g*, upon the axle of the fly wheel *h*; and this may be made to revolve by a winch or handle upon the fly wheel, in the middle of the machine, or by an axle and winch placed elsewhere, and connected to cranks on the pinion shaft by crank rods.

The articles to be mangled are, after having been wrapped in protecting cloths, as usual, to be passed into the machine under the roller *b*, when, by the rotation of the wheel *f*, the roller *b*, will be made to revolve, carrying the articles round with it, which, by the pressure of the upper roller, will become mangled when the machine has been in operation for a sufficient time.—[*Entered in the Petty Bag Office, July, 1832.*]

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To FREDERIC STEINER, of Church, near Blackburn, in the county palatine of Lancaster, manufacturing chemist and Turkey red dyer, in consequence of a communication from a foreigner residing abroad, for an invention of a certain process or processes by which spent madder or madders that have been previously used can be made to yield a great quantity of colouring matter, and for dyeing with the same in various colours all descriptions of cotton, linen, wool, silk, or any mixture of them ; and also for improving for dyeing madders that have not been previously used.—[Sealed 2d June, 1832.]

THE object of the Patentee is to partially restore the property of madder, that is, madder which has been used for dyeing the colour called Turkey red. When the colouring matter has been extracted from the madder by the ordinary process employed for that purpose, and it is in a state called spent, the spent madder is then to be mixed with a solution of weak sulphuric acid, that is diluted by water ; which acid, by acting upon the vegetable fibre, will revive its red colouring properties.

Other acids may be employed for this purpose, or salts having an acid base ; and when the acid has acted sufficiently upon the madder, a quantity of pure water is to be poured upon it, for the purpose of taking up the acid. This water is to be drawn off from the surface, and fresh water introduced several times, until the acidity is completely removed.

The colouring property of the restored madder will be about one-third of that which it originally gave out by the ordinary process of extracting ; and it may be either dried, or used in its wet state : the latter of which is preferred, as causing less trouble.

The colour extracted from the restored madder will be fugitive in all articles but cotton ; for other goods it may be rendered permanent by the addition of nutgalls, or other astringent and tanning matter.

Observing these provisions, goods of every kind may be dyed by the restored madder, using about three times the quantity which would be required if the madder was fresh : the same means being resorted to in preparing the goods which are commonly adopted in dyeing such articles ; and the colouring property of madder in its fresh and unused state may be greatly improved by treating it with acid in the same way as spent madder.—[*Enrolled in the Petty Bag Office, August, 1832.*]

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*To THOMAS PETHERICK, of Penfullick, in the parish of Tywardreath, in the county of Cornwall, mine agent, for his having invented certain machinery for separating copper, lead, and other ores, from earthy and other substances with which they are or may be mixed ; and which is more particularly intended to supersede what is commonly called jiggling.—[Sealed 28th April, 1830.]*

IN separating ores from the earthy materials with which they are found in a natural state, it is usual after the ores have been reduced to small particles to remove the earthy matters, by washing them away from the metallic parts. This is commonly done by boys, who take a portion of the material in a sieve, and by shaking and stirring it about for some time in a stream of water, ultimately wash away the earthy matters, and leave the ore in a tolerably pure state. This operation, when performed by hand, is called jiggling.

In order to supersede this laborious operation, the Pa-

tentee has introduced a machine for effecting the same object, which is to be worked by steam or by water, or other power applied to a rotary axle.

Plate XIV, fig. 15, represents the machine in section taken vertically, with the parts by which it is proposed to be actuated attached thereto.

A vessel formed cylindrically in the upper part, and conically at bottom, is represented at *a*, *a*, and is firmly fixed upon strong wooden standards.

The cover *b*, *b*, of this vessel, which is attached thereto by flanges and bolts, has a series of circular apertures, *c*, *c*, with rims round them sufficiently large to receive each a sieve of the ordinary size and kind employed for the jiggling operation.

In each of these apertures *c*, a sieve is placed, containing the ore and earthy matters intended to be separated; and the sieves respectively resting upon a ledge or flange below, and covered by a lid above, thus hold the material to be operated upon, when the machinery is put in action.

A plunger or piston *d*, attached to a rod *e*, is enabled to slide up and down in the central aperture by means of its connexion with the vibratory lever *f*: this piston or plunger is properly packed on its edges, in order to render it tight; and to enable it to slide truly its rod *e*, passes through a hole in the bridge *f*.

The upper end of the piston rod *e*, is connected by a bridle rod to the vibratory beam or lever *g*, which swings upon a fulcrum in the middle, supported on the stationary beam of timber *h*. The reverse end of the vibratory beam *g*, is attached to a sweep rod *i*, connected to the crank *k*, on the axle of the rigger and fly wheel *l*, below.

The vessel *a*, being filled with water by a pump through the aperture *m*, the plunger *d*, is then made to work up and down by the rotation of the crank and vibration of the

beam; by which means, on the descent of the plunger, the water in the vessel will be forced up through the sieves *c*, and through the materials contained in the sieves; and on the rising of the plunger the water will descend again through the sieves.

Thus, by the reciprocating movements given to the plunger, the water will be made to pass up and down through the sieves, and effectually wash away the earthy matters connected with the ore.

As the water in the vessel *a*, will very soon become muddy, from the quantity of earth washed down through the sieves, it is proposed that a pump shall be occasionally employed, injecting a fresh supply of water by the aperture *m*, at the same time, holes which have been closed by plugs in the cylindrical part of the vessel *a*, must be opened, for the purpose of allowing a portion of the foul water to flow away; and as the heaviest parts of the earthy matters will subside to the bottom, when that water has been drawn off, the earth may be removed by opening a door in the conical part of the vessel, provided for that purpose.

[*Enrolled in the Inrolment Office, October, 1830.*]

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To THOMAS BRUNTON, of Park-square, Regent's-park, in the county of Middlesex, Esq., and THOMAS JOHN FULLER, of the Commercial-road, Limehouse, in the same county, civil engineer, for their having found out and invented an improvement or improvements on certain mechanical apparatus applicable to the raising of water and other useful purposes.—[Sealed 15th November, 1831.]

THE subject of this patent is the employment of elliptical wheels for driving crank rods, by which a pump or pumps may be worked for raising water.

Plate XIV, fig. 16, shows a pair of elliptical wheels with teeth, taking into each other as they revolve; *a*, is the driving wheel, to the excentric axle of which the driving power, whether a winch or other first mover, is to be applied. This wheel, being made to revolve, actuates the other wheel *b*, to the excentric axle of which a crank *c*, is affixed, and to this crank a rod *d*, is connected by a joint. As that part of the periphery of the driving wheel *a*, which has the smaller radius acts upon the periphery of the larger radius of the wheel *b*, the motion of the crank rod will be necessarily slower than when the periphery of the larger radius of the driving wheel *a*, acts upon the periphery of the smaller radius of the wheel *b*; which differential movements it is considered may be with advantage applied to a pump for raising water, in order to give an accelerated or retarded movement to the pump rod, at certain periods, as it ascends and descends in the pump barrel.

Two or more pairs of these elliptical wheels may be mounted in a frame, and actuated simultaneously in connexion with cranks and rods, for the working of several distinct pump barrels.

A similar adaptation of elliptical wheels is proposed to be applied in connexion with a cam upon the crank wheel, for the purpose of working the tail of a punching lever, for piercing holes in iron and other metal plates.

The Patentees say, that as elliptical wheels have been used before, the axles of such wheels being in the centre of the ellipses, they claim the adaptation of wheels for the above purposes, the axles of which are placed excentrically, or in the line of the transverse diameter.—[*Enrolled in the Petty Bag Office, May, 1832.*]

We are surprised at seeing the above claimed as a new

invention, when excentric wheels, formed of elliptical and a variety of other shapes, have been for years in common use, adapted to all sorts of machinery in which differential motions are required.

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*To WILLIAM ERSKINE COCHRANE, of Regent-street, in the county of Middlesex, Esq., for his having invented an improvement or improvements on his patent cooking apparatus.—[Sealed 20th March, 1830.]*

THE subject of this invention has reference to a former patent, granted to the same inventor, dated 15th January, 1828, for certain improvements in cooking apparatus ; for the particulars of which, see our Journal, vol. vii., second series, page 283.

In the specification of the previous patent, two distinct apparatus were proposed, the one being a portable oven, the other a portable steam boiler, each of which it was intended to heat by the flame of an Argand lamp. In the present instance these two contrivances are combined in one apparatus, so that the flame from one Argand burner may heat both the boiler and the oven.

Plate XIV, fig. 17, shows the apparatus in section taken vertically, and supported upon a suitable stand ; *a, a*, is a cylindrical chamber, containing water, which may be introduced at the aperture of the cap-piece *b*. The lower part of this chamber at *c, c*, is formed as a cylindrical tube, and it is bevelled round the edge for the purpose of fitting the top of an Argand lamp *d*.

In the centre of the cylindrical vessel forming the chamber *a, a*, the vessel *e, e*, is placed, its circular flange resting upon the upper edge of the outer cylindrical vessel, and fitting thereto perfectly close.

The flame of the lamp *d*, passing upwards, plays round the flue or channel formed between the vessels *a, a*, and *e, e*, heating them both ; and any smoke which may arise will be allowed to pass off through small holes round the upper part, through or beneath the flange.

Victuals intended to be cooked in the oven are to be placed in the dish *f*; and the cover *g*, being put upon the vessel *e, e*, and made fast by suitable catches. The heat of the lamp will cause the victuals to be baked ; at the same time steam will be generated in the vessel *a, a*, which it is intended shall pass through the cock *h*, to another vessel to be placed alongside for the purpose of receiving victuals which are to be cooked by steam. Several of these steam-cocks may be adapted round the elevated part of the chamber, and made to lead off to other steam vessels.

The chamber *a, a*, must be furnished with a safety valve, to prevent accident, in the event of the steam exerting too much pressure. A cock also must be introduced in the side of the chamber, as at *i*, for the purpose of gauging the quantity of water contained in the boiler, and another at bottom for drawing off the contents when required.

In order to examine occasionally the intensity of the flame of the lamp, and its action within the flue, and against the bottom and sides of the vessel *e, e*, a tube is inserted through the boiler at *k*, which must be closed on the outside by a plug.

The apparatus may be varied in its construction according to the taste of the manufacturer, without deviating from the principle claimed, which is that of combining a boiler and oven in one apparatus, and heating them both by the flame of a lamp.—[*Inrolled in the Inrolment Office, September, 1830.*]

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## ORIGINAL COMMUNICATIONS.

## ON THE EFFECTS OF SIZE IN MECHANICAL CONSTRUCTION.

The influence of size upon the strength and forcible motion of machines and mechanical structures generally, is strikingly exhibited in the difference between the results obtained from models of machines, and the results of the same machines executed on a large and powerful scale.

When a new theory or fundamental proposition in science is put forth, or when a new machine is invented, we frequently find conclusions drawn from experiments made with small models, which are not supported afterwards by the results of practice on a large scale; and hence practised engineers put very little faith in the results obtained by experiments with models.

There are several reasons for this frequent discrepancy between experimental and practical results that the same reasons do not operate in all cases, and it is useful to distinguish between them.

One reason why the effect of a model of a machine is very frequently no index of the effect of the machine itself, is, that the *intensity of operation* of the properties of matter is not always proportionate to the mere *quantity of matter*, that is, there is, in respect to all matter, a certain point at which its properties *begin to act*, and before which they are only *latent*. And in models very frequently that point is not reached at all.

For example, let us take *vibration*.

A *heavy iron chain* suspended between two points, may, by setting it swinging, be broken by its *own vibration*. But if a *very slender wire* were suspended between two points proportionally distant from each other, it would be impossible to cause it to break by *its own vibration*.

The reason of the difference of results is, that the cause of fracture is the *momentum acquired by the body in motion*; which momentum, being governed by the *weight and square of the*

*velocity*, may easily be caused, in the case of a heavy chain, to exceed the *ultimate strength* of the chain.

But in the case of a fine wire, the *weight* being next to nothing, the momentum requisite to cause fracture can only be produced by combining the weight with a *very high velocity*; a velocity in fact so high, that it would be, from the nature of the experiment, almost impracticable to obtain it.

Hence the point at which *effective vibration* begins, is beyond the limits of a trial with a wire, and within them in a trial with a chain.

Again, in respect to *friction*: In all bodies that we know the particles require a certain time to yield to *forcible disturbance* of their positions. This is the reason why a boat drawn through the water at a very high velocity rises towards the surface, and has its displacement diminished. The number of particles of water displaced requires a greater time to yield to the force applied to each successive layer of particles, than is allowed to them by the velocity of the boat. Hence the *boat* is compelled to yield, and run above those particles which it cannot disturb.

The same is probably the reason of the *ascertained fact*, that "the draught of a stage coach on a common turnpike-road increases in a *less ratio than the velocity*;"\* and of the most probable fact, that the same law obtains in respect to railroad carriages. That is, in both cases, the materials of the road are of the nature of fluids, in so far, that bodies laid upon them, which have sufficient weight to cause *any sensible friction*, do so by *sinking into the substance of the material*, perceptibly or imperceptibly. And the carriage wheels, when put in motion, must either crush all those particles which lie in front of them, or displace the particles, or else be displaced by them.

Now because the particles of the road, whether iron or stone, require (like the particles of other bodies) a *particular time* (according to their particular nature) to yield to force, and be disturbed without being crushed, it follows, that unless the super-

\* Vide Sir H. Parnell on Roads, p. 337. Mr. M'Neill's Paper.

incumbent weight be sufficient to *crush* the particles, it will, if the increments of its motion be greater than the time required by the particles of the road to yield to its force, be lifted up above those particles which it can *neither crush nor displace*. By this rising partially out of the medium in which it moves, it becomes a body of less displacement, and meeting fewer particles, will have less friction, if its velocity be maintained. (See a former paper on this subject, vol. ii. p. 292.)

Now all this theory depends upon observations which could not be made satisfactorily in experiments on a small scale; because the thing to be observed is the operation of properties of matter, which are *latent* up to a certain point; that is, the compressibility of a good turnpike-road, or of an iron railroad, is latent, until a *certain amount of weight* be applied upon it, and that amount would be unattainable in a model. Hence experiments upon plans for impelling locomotive carriages, where the advantage or disadvantage depends upon the question of increase or diminution of friction, are inconclusive when conducted on a small scale, because they *never bring the resistance sought to be measured into operation*.

In all experiments, therefore, before settling the size of the models, or indeed before determining whether models shall be used at all, it should be ascertained whether the forces that will be brought into play in them, will be of *sufficient absolute intensity* to act at all upon the *forces of resistance* they will encounter; because, if too small to do that, it is plain that they are quite useless, and are no index whatever to the real operation of the machines constructed after them. Another reason why the results of experiments with models are so often inconclusive is, that the operations being on a very small scale, and *all the quantities* proportionably small, their *differences* are necessarily too minute to be accurately estimated, and very small errors lead to very erroneous inferences. And further, in constructing models, we seldom observe that proportion between *the strengths and forces of the operative parts*, and the *strengths and forces of the resisting parts*, which we must observe in a large structure;

and the mind is usually inclined to make small things over strong, so that defects of principle escape under cover of a mass of matter.

Errors have clearly been traceable to these sources in some instances where works have been executed on a small scale, and have answered; and on a large scale, precisely on the same principle, and have failed.

In the early periods of constructing suspension bridges, many of small size were made with the platform supported by inclined wires, which stood very well. Afterwards, a large one was attempted on the same plan, and was broken down by a gale of wind. There is no reason to suppose that it failed from bad proportions or bad workmanship; but the reason of the difference of results was, that the principle of the construction is defective, because the chains, if drawn nearly tight, are too much weakened. If left slack, forming all different curves, their vibrations (produced by a gale of wind) are unequal in amount, and hence each does not bear its fair share of strain.

This defect of principle would remain latent in a *small structure*; first, because there would most likely be a great superabundance of strength; secondly, because the whole mass of matter would be too light to injure itself by its own vibration. But when the same principle was carried into a larger structure, the force brought into operation by motion of the parts would be greatly increased; the strength of the parts would most likely not exceed so much the resistance to be overcome, and the defect of principle ceased therefore to be latent.

Again, in constructing *steam-engines*. The bell-crank engine, made of a small size, answered very well; it was attempted on a large scale, and failed. Now the defect of the bell-crank engine is, that it is out of balance; the piston being *urged* by its own weight, and that of the parts connected with it, in addition to the force of the steam, in the *down stroke*, and being *resisted* by the same weights in the *ascending stroke*. This defect of principle was latent while the machine was of small power; because the weight that acted in an injudicious manner was so small in

proportion to the mass and strength and hardness of the materials, as not to acquire sufficient momentum to affect sensibly the stability of the structure or the wear of the materials: but in a large machine the hardness of the materials remained the same, and the mass of matter that had to endure the force transmitted through it, and was probably (on the principle that large structures are usually made weaker in proportion than small ones) much less in proportion to the amount of force transmitted than in the small engine. Hence the defect of principle became sensible.

Lastly, the extraordinary results said to be obtained lately in experiments upon an undulating railway, and the inferences drawn from them by many not firm in their mechanical faith, are a striking example of that cause of error which springs from overlooking some effects or circumstances, and the differences between quantities observed, on account of the minuteness of the quantities dealt with.

It is affirmed, and I believe with truth, that in those experiments a model of a locomotive carriage, impelled by a spring, performed a given horizontal distance on an undulating railway, in less time than it performed the same horizontal distance on a horizontal railway,—all other circumstances, except that of horizontality and undulation, being *apparently* alike; and hence a total subversion of received principles was inferred. The error of the inference arose from its not being at first observed, that in the case of the horizontal line the model had *more disposition to forcible motion left in it after performing its journey*, than it had on the undulating line: nor did it require any extraordinary neglect to allow such a fact to pass unnoticed, as the difference was probably so minute as to be hardly perceptible, unless measured by some delicate instrument.

In conclusion, therefore, I would observe, that experiments with models, to be at all relied on, should be conducted with the most minute attention, to endeavour to place them under like circumstances in all respects to those that will take place in practice on a large scale; that they should never be resorted to

when experiments on a large scale *can be made*; and that they should never be trusted, under any circumstances, as furnishing more than *data to judge of probable effects*.

Your obedient servant,

T. S.

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ON SUGAR REFINING, IN FRANCE.

As it is universally known that syrups are injured and decomposed by being too long exposed to an intense heat, various means have been tried to avoid the loss thereby incurred.

The methods which have met with most approbation, are, 1<sup>o</sup>, the system of evaporating by steam; 2<sup>o</sup>, the system of evaporating *in vacuo*. Both are a decided improvement on the process of evaporating on the naked fire.

But through the agency of steam, the syrups can be granulated only when raised to the temperature of 90 to 92 Réaumur, and when heated to that pitch, a material portion of the syrup is still decomposed.

The granulating *in vacuo* is attended with inconveniences of another kind. That system requires a great supply of water, expensive and complicated machinery, very liable to get out of order: besides, the operation takes place in closed and air-tight vessels, and the refiner cannot keep his eye upon it to direct it properly.

Some refiners have tried the use of atmospheric air to facilitate evaporation, but they have been obliged to renounce a scheme which they could not realise.

The art of sugar refining was, then, very far from perfection in France, when an invention, ingenious in its application, great in its results, and remarkable by a success which daily increases, produced a complete revolution in that branch of industry.

A refiner of Lisle, Mr. Brame Chevalier, struck with the idea of using simultaneously steam for raising the syrup to the proper degree of heat and air, heated by the same steam to maintain the syrup in a continual agitation, conceived the possibility of obtaining by this means a very rapid, very extensive evaporation, and at a very low temperature, thereby preserving the syrup from decomposition, and procuring a great economy of fuel and labour, and also greater returns in sugar.

This very ingenious theory has been most successfully realised. Nothing can be more perfect nor better contrived than the apparatus by which these results have been obtained—(See Newton's Patent for Improvements in Evaporating Syrups, &c. communicated from abroad, p. 161, in the present volume.)

A generator supplies the steam required to work a pump, which drives the air into a cylinder: there the same steam heats the air to a proper degree: the heated air is then driven under the false bottom of a boiling pan, heated itself by steam, escapes by small apertures through the syrup, which it causes to boil immediately. The surplus of steam and heated air is used for warming the stove and store rooms, so that every operation of sugar refining, even that of clarifying, may be made with one boiler and one machine, without the slightest danger of fire.

The boiling takes place in an instant, and as soon as the hot-air cock is opened. Evaporation takes place at 45 degrees of Réaumur; granulation is effected in 8 minutes, between 65 and 75 degrees of Réaumur.

Martinique sugars of the 4th quality, worked in this machine, do not produce more than six per cent. treacle, and fourteen per cent. of pale brown sugar, called in France *Vergeoise*.

But great and important as this system is for sugar refiners, it is still more beneficial to sugar manufacturers, who extract the sugar from the beet-root or the cane. It is easily conceived, as the saccharine juices, which do not weigh more than ten degrees, must be exposed much longer to the fire than the syrups proceeding from the melted sugar, which weigh generally thirty degrees. Moreover, by blowing hot air through the juices, they are purified of any unpleasant taste they may have acquired.

Finally, the advantages, which account for the decided preference obtained by the system of Mr. Brame Chevalier, consist in its procuring more and finer sugar from the same quantity of raw materials of the same sort, and, moreover, in manufacturing, with greater rapidity, a superior sort of sugar.

These are positive facts, which are daily proved and verified by the great number of visitors who call at Mr. Brame Chevalier's sugar refinery at Lisle.

## NOVEL INVENTIONS.

### DOCTOR CHURCH'S STEAM CARRIAGE.

IT was our intention to have laid before our readers in the present number a detailed description of Dr. Church's steam carriage, but we find that we are obliged to defer it for the present. We have, however, much pleasure in stating, that the Doctor has not the slightest doubt of being enabled to bring this invention before the public very shortly in a complete state.

We are favoured with the observations of a scientific friend resident in Birmingham, who has frequently witnessed the experimental performance of the machine, and viewed it,

we think, with considerable impartiality. He says—"Dr. Church's carriage has been taken out several times upon the public road, and appears to have many good qualities; but taken as a whole, I doubt whether it is at present in the best form to enable it to be employed profitably, though the Doctor, I hear, is far from admitting this. It has not yet had a fair trial by any means, and it is possible I under-rate it. The workmen are quite confident they can run it to London when they are allowed to try, and really I see no reason why they should not.

"The machinery has plenty of power, that is, *any quantity of steam* can be raised (there appears to be scarcely any limit to the quantity that the boiler will generate). The machinery works beautifully, and the frame-work is as stiff as a church.

"Some slight accident has generally happened when it has been brought out, not of any material importance, but still sufficiently so to be called an accident,—some little breakage, some fault in the steering, caused by the clutches not being yet thoroughly adjusted, so as to ship and unship with facility.

"The faults of the carriage I conceive to be, that it is too large and cumbrous—that the cylinders are larger than required, 12 inch. The boilers are so large, and get up steam so fast, it requires a great degree of nicety in feeding the fire, and in supplying the water to adjust, economically, the supply of steam to the work required. It appears to me that there are all the essentials, but that they are not blended, perhaps, in the best possible way; still practice alone can determine the proper proportions, and it is unreasonable to look for perfection without practice.

"Dr. Church has a drag engine in a state of great forwardness: in that he supposes he has overcome all the defects of the carriage; it does, indeed, promise well.

"I am convinced the public will not readily travel in steam carriages at first; and that the safest and best application will be by drag engines to take large carriages, or omnibuses, or goods in waggons, in tow. I am quite satisfied that the Doctor can get up all the power that can be required.

"If you can gather any information from this letter I shall be glad. I have put down my thoughts upon the subject without any attempt or disposition to over-rate or to under-rate the carriage."

## S U G A R R E F I N I N G.

(Concluded from page 262.)

The ground of my expectation will appear in a clear light, if two or three days' work of the third experiment be compared with analogous ones of the sixth, in reference to the absolute weights of the raw and refined products in the two cases.

Thus, on the first day's work of the sixth experiment, 13cwt. 2qrs. 13lbs. of refined (double standard) sugar are obtained from 34cwt. 1qr. 19lbs. of raw; whereas by the proportion of the third experiment 35cwt. 2qrs. of raw should have been required, giving a saving on a single day's operation with like weights of 12lbs.

In the second day's work of the sixth experiment, 14cwt. and 23lbs. of double standard loaf sugar were obtained from 32cwt. 3qrs. 18lbs. of raw, with the scum liquors of the preceding day's work, whereas by the proportions of the third experiment in like circumstances 33cwt. 2qrs. 8lbs. would have been required. It deserves further remark, that the second day's work of the third experiment was not equal to double standard, and should therefore have been heavier instead of lighter. In fact, with 74lbs. less of raw material in the sixth experiment, the same weight of refined goods, and that of much better quality, is obtained, as in the third, the scum liquor of which should have also been greater from the greater quantity of raw sugar in its previous day's work. These facts prove beyond a doubt that the boiling process was unexceptionably good. By a careful comparison of the saccharine liquor before boiling and afterwards, it was found that the colour in either case was the same, when the specific gravity was made the same, whereas it is well known that syrup is very apt to darken in its final concentration. In the third day's work of the sixth experiment, 32cwt. 2qrs. 1lb. yield in double standard loaves 15cwt. 2qrs. 15lbs., while by the ratio of the third experiment 36cwt. 3 qrs. 14lbs. would have been required to produce the above weight of refined in single standard loaves. Here the result is surprisingly great, and places the principles of my refining operations, as latterly conducted, in a satisfactory point of view. With 4cwt. 1qr. 12lbs. less sugar, the same weight of a superior refined article was produced.

On instituting a comparative analysis of the several days' work of these two experiments, when the drainage syrup were boiled up along with raw sugar liquors, we shall find the same marked superiority in the products of the sixth, both in quantity and quality, over those of the third. We shall leave this minute calcification to the curious, having fully demonstrated that whatever saccharine liquors were brought to the safety boiling-pan, were well accounted for in every period of the sixth experiment. But if, under the influence of corrupt motives, the rich syrups are made to disappear, in the course of the work, that defalcation would show itself at the end of the process, which characterises the fifth and especially the sixth experiment.

The fifth experiment had the benefit of the same improvement in the boiling department which acted so advantageously in the sixth experiment; and had the sugar weighed out and put into the clearing-pan been fairly dealt with, that excessive deficiency in the refined products of the days' works of the fifth could not by any possibility have occurred.

If we compare two similar days' work, for example, that of January 4th in the fifth experiment, and that of January 29th in the sixth, we shall find 14cwt. and 25lbs. of loaves obtained in the latter case from 32cwt. 3qrs. 18lbs. of raw sugar (with scum liquor), and only 12cwt. 2qrs. 3lbs. of loaves from 33cwt. 2qrs. 8lbs. in the former (also with scum liquor). By the ratio of the sixth, 12cwt. 2qrs. 3lbs. of loaves would have been got from 28cwt. 2qrs. 14lbs. instead of 33cwt. 2qrs. 8lbs., that is with 4cwt. 3qrs. 22lbs. less sugar. Now there is no latitude of variation in the sugar, or circumstances capable of admitting of this diversity of results. I am therefore under the painful necessity of concluding that about 7cwt. of the sugar of the fifth experiment must have been abstracted and wasted in the clarifying stage, and 9cwt. of the sixth in the shape of the syrups of drainage.

I shall observe finally, that if the Brazil sugar of the fourth experiment had been boiled by the improved means of the fifth and sixth experiments, fully 8lbs. more per cwt. of refined sugar would have been obtained, with a corresponding diminution of the treacle. Such clayed Brazils are almost equivalent to ordinary crushed lumps for refinery purposes. In fact, the manufacture of good clayed sugars is very analogous to the operations of refining sugar in Europe.

### GENERAL ABSTRACT OF THE EXPERIMENTS.

### Experiment 1.

£ s. d.  
Damaged Clayed Brazil Sugar 152 cwt. 1 qr. 13 lbs. at } 331 8 0  
19s. 6d. duty taken at 24s., price

Drawback payable on Extracts, 1*l.* 6*s.* per cwt.

## Refinery Extracts per Sale by Custom-house,

Cwt. qrs. lbs.	£	s.	d.	per cwt.	£	s.	d.
1 3 1 Double standard loaves	3	12	0	per cwt.	71	2	4
68 2 24 Single	3	6	5	"	228	4	4
23 1 25 Bastards	2	3	6½	"	51	2	3
30 1 22 Treacle	1	3	0	"	35	0	4
					£385	9	9
Balance in favour of Refinery					54	1	9
To which add Profits from Revenue					14	8	9
Total Balance in favour of Refinery					£ 68 10 6		

## Experiment 2.

Mixture of the above Brazil sugar at 19s. 6d. with its own weight of Jamaica at 22s. 6d., weight of both 198cwt. 3qrs. 15lbs., duty at 24s., price - - - - -

447 10 0

Drawback payable on Extracts, 11. 7s. 3½d. per cwt.  
Refinery Extracts per Sale,

Cwt. qrs. lbs.	£	s.	d.	per cwt.	£	s.	d.
47 3 25 Double loaves at	3	12	0	per cwt.	172	14	7
72 1 2 Single	3	6	5	"	239	17	11
29 0 17 Bastards	2	3	6½	"	63	9	0
37 3 21 Treacle	1	3	0	"	43	13	0
					£521	14	6
Balance in favour of Refinery					74	4	6
Add Profits from Revenue					32	14	5
Total Balance for Refiner					£106	18	11

## Experiment 3.

Jamaica Sugar at 22s. 6d., weight 199 cwt. 14lbs., price, duty included - - - - -

462 19 6

Drawback payable on Extracts, 25s. 5½d. per cwt.  
Refinery Extracts per Sale,

Cwt. qrs. lbs.	£	s.	d.	per cwt.	£	s.	d.
13 3 6 Double standard loaves at	3	12	0	per cwt.	48	16	3½
96 3 10 Single	3	4	7½	"	312	19	8½
38 2 12 Bastards	2	5	9	"	88	8	4
41 1 12 Treacle	1	2	5½	"	46	8	11
					£496	13	3½
Balance in favour of Refinery					33	13	9½
Add Profits from Revenue					14	16	6½
Total Balance to Refinery					£ 48 10 3½		

TABLE II.—Second Experiment.

TABLE III.—Third Experiment.

DATE.	BRITISH SUGAR.	QUANTITY AND QUALITY of SYRUP TAKEN INTO PAN.		PRODUCE.	WEIGHT.	REMARKS.
		Gathering Pots.	Cent. grs. lbs.			
1859:						
June 13	35 1 11	.. .. ..	.. .. ..	152 .. .. .. .. ..	13 2 6	
" 15	28 8 17	.. .. ..	.. .. ..	82 .. .. .. .. ..	12 1 0	
" 18	30 3 19	17 Hambro' and single loaf green and second	.. .. ..	59 .. .. .. .. ..	16 0 7	
" 20	28 2 18	16 Hambro' and single loaf green and second	.. .. ..	56 .. .. .. .. ..	16 0 0	
" 22	26 1 23	20 Hambro' loaf green, Prussian lump green, and single loaf second	.. .. ..	42 .. .. .. .. ..	15 2 5	
" 27	22 2 6	29 Prussian and small lump green	.. .. ..	44 .. .. .. .. ..	15 3 0	
July 3	30 .. 21 0 .. 6 ..	32 syrup (variety) 16 single Prussian and small lump green	.. .. ..	22 .. .. .. .. ..	—	
" 7	.. .. .. .. ..	22 large lump green	.. .. ..	27 .. .. .. .. ..	10 3 27	
" 12	.. .. .. .. ..	20 large lump green	.. .. ..	.. .. .. .. .. ..	16 .. .. .. .. ..	
" 23	.. .. .. .. ..	40 small lump second and large lump green	.. .. ..	.. .. .. .. .. ..	16 .. .. .. .. ..	
" 30	.. .. .. .. ..	48 large lump green and second	.. .. ..	.. .. .. .. .. ..	—	
Aug. 8	.. .. .. .. ..	17 large lump drips	.. .. ..	.. .. .. .. .. ..	21 .. .. .. .. ..	
" 13	.. .. .. .. ..	.. .. ..	.. .. ..	.. .. .. .. .. ..	4 .. .. .. .. ..	
" 18	.. .. .. .. ..	101 Prussian lump second green and drips	.. .. ..	.. .. .. .. .. ..	4 3 0	
Sept. 19	5 0 27	used for Bottoming.	.. .. ..	.. .. .. .. .. ..	—	
	0 0 5		.. .. ..	.. .. .. .. .. ..	5 .. .. .. .. ..	
						13 2 6 equal.
						whereof { 96 8 10 Single bonny.
						38 2 12 Bastards.
						41 1 12 Treacle.
						H. V. M.
TOTAL	199 0 19				110 1 16	

TABLE IV.—FOURTH EXPERIMENT.

TABLE V.—Fifth Experiment.—(Jessicee Sugar.)

DATE.	RAW SUGAR taken into PAN.	QUANTITY AND QUALITY of SYRUP TAKEN INTO PAN.		PRODUCE.		REMARKS.
		Cwt. grs. lbs.	Gathering Pots.	Cwt. grs. lbs.	Double BOUNTY.	
1 1832 : Dec. 28	33 0 12		134	43	12 0 27	One leaf used for bottoming.
2 " 31	32 3 5			75	6 2 13	One leaf used for bottoming.
3 1833 : Jan. 3	3 4 4			80	11 2 11	Filter stopped.
4 " 4	33 2 8	12 Hamb' loaf green			12 2 3	—
5 " 7	29 3 22	28 single leaf green		57	7 2 5	Two leaves used for bottoming.
6 " 11	24 3 8	25 single lf. & Prussian lp. green		40	—	—
7 " 14	20 0 23	13 Hamb' and single loaf 2nd		37	—	Foots sugar made into 8 meltings, and boiled Feb. 6.
8 " 16	8 2 25	143			13 0 24	—
9 " 18	32 3 2	86			13 1 27	—
10 " 22	24 0 14	49			13 1 16	—
	22 2 17	22 Hamb' and single loaf green			—	Foots sugar made into 8 meltings, and boiled Feb. 6.
11 " 28	8 0 12	28 large lump green		30	—	—
12 " 30	8 0 7	ditto		15	—	—
Feb. 6	2 21	29 Ham. lf. 2nd & Pruss. lp. 2nd & gr. 41 Pruss. lp. 2nd & gr. & lar. lp. gr.		26	—	—
13 " 11	6 1 10	16 Ham. & single lf. lp. & meltings, and drainage from meltings		80	—	—
14 " 14	0 2 15	38 small lump drops, and Prussian lump second and green		16	—	—
15 " 19	10 0 16	30 large lump green		44	—	—
16 " 23	4 1 15	38 Pruss. lump green, sm. lp. 2nd and drops and heading		—	17	—
17 " 28	—	22 sm. lp. 2nd & drops, & Pruss. lp. green, and drops with heading		—	—	—
18 " Mar. 7	—	27 lar. lp. green & smear from best.		14	—	—
Apr. 13	—	32 lar. lp. 2nd, & drops & headings		23	—	—
" 26	—	Smear from 51 bastards		17	—	—
May 15	—	22 large lump green		7	—	—
June 14	—	Smear from 19 bastards		12	—	—
311 3 20	0 2 9	Loss by drying in. From Fourth Experiment.		1	—	—
1 0 0	—	Taken to Sixth Experiment.		78 1 15	124 0 23	—
313 2 1	—	—		78 1 15	78 1 15	—
1 2 20	—	—		203 2 10	46 1 5	—
311 3 9	—	—		41 1 14	21 2 8	—
				311 3 9	H. V. Morgan.	

TABLE VI.—SUGAR EXPERIMENT—(Montserrat Sugar).

DATE. No. of Days, work	QUANTITY AND QUALITY OR SYRUP TAKEN INTO PAN.		PRODUCE.		REMARKS.	
	RAW SUGAR TAKEN INTO PAN.	G. POTS.	Cwt. grs. lbs.	Double Bounty.	Single Bounty.	Cwt. grs. lbs.
1833						
1 Jan. 24	34 1 19	143	13 2 13			
2 " 29	38 3 18	88	14 0 25			
3 " 31	32 2 1	165 1	15 2 15			
4 Feb. 5	20 1 16	70	19 3 0			
5 " 7	31 2 22	95	16 0 20			
6 " 12	25 3 19	52	19 3 15	{ 4 of this day's work used for bottling, and remainder reboiled		
7 " 19	4 3 12	29	17 2 9	May 7.		
8 " 36	0 20	16 1 22				
9 " 21	51 2 23	17 2 9				
10 " 28	21 2 24	22 0 19				
11 Mar. 5	15 2 0	34 small lump 2nd and Prussian lump green	13 0 16			
" 12	15 8 3 12	34 large lump green	9 1 5			
12 " 21	6 0 0	28 Hambro' & single loaf second & drips	9 1 5			
13 " 21	39 single loaf green, Prussian lump green, and large lump drips	58, 30	10 2 24	[April 25, this day's work reboiled April 26.		
14 " 25	27 single loaf 2nd and Prussian lump 2nd	17				
" 26	From 9 bastards made March 12	9				
Apr. 1	20 large lump green and heading	12				
15 " 3	25 single loaf 2nd & Prus. large & lp. dpa.	11				
" 12	8 large lump green and 7 bastards (reb.)	7				
" 19	11 large lump green	7				
16 " 25	19 Prus. lp. gr. & dpa., & No. 14 reboiled	10				
17 May 7	1 Pruss. lump drips, and No. 7 reboiled	4 0 3				
" 15	12 large lump green and heading	—				
" 24	Smear from 39 bastards	—				
June 24	Remainder of 5th Experiment, and 16 pots single loaf second and drips	17				
" 30	114 large lp. green, 2nd & drips & heading	6 1				
304 3 9	Loss occasioned by drying in.	113 1 20	98 3 19			
0 2 6	Remainder of 5th Experiment to add.	113 1 20	113 1 20			
1 2 20		213 1 11	213 1 11			
307 0 7	..Total.	Bastard Sugar . . . . .	28 0 26			
		Treacle . . . . .	40 1 1			
			280 3 10			
			26 0 25			
			307 0 7			

H. V. Morgan,  
July 15, 1833.

SOCIETY FOR THE ENCOURAGEMENT OF ARTS,  
MANUFACTURES, AND COMMERCE.

*The Rewards adjudged by the Society during the present Session,  
presented to the respective Candidates, by his Grace the Duke  
of Sutherland, Vice-President, 3d June, 1834.*

*In the Classes of Agriculture, Chemistry, Colonies, and Trade,  
Manufactures and Mechanics.*

- To Mr. C. Bush, Garden-row, Camberwell, for his improved castor for tables, &c., the silver Isis medal. For his folding shutters for a shop, the large silver medal.
- Mr. S. Walker, Anne-street, St. George's-in-the-East, for his method of feeding steam-boilers, five pounds.
- Mr. J. Hughes, Sebright-street, Bethnal-green-road, for his warping jack for silk weavers, five pounds.
- Mr. J. Laurie, Oxford-street, for his spring bar for a stirrup, the silver Isis medal.
- Mr. J. Warner, Spanu's-buildings, St. Pancras, for his method of preventing the accidental discharge of fire-arms, the silver Isis medal.
- Capt. T. M. Bagnold, R.M., High-row, Knightsbridge, for his anatomical puncturing forceps for preventing accidents in sewing up bodies after *post mortem* examinations, the large silver medal. For conveying seeds of Araucaria imbricata in a vegetating state from Chili to London, the large silver medal.
- J. Aylwin, Esq., Quebec, for his essential oil of spruce, the large silver medal.
- Capt. J. N. Colquhoun, R. Art., for his communication on dried plantains, the large silver medal.
- Mr. T. B. Smith, St. Albans, for his application of Brazilian plat to the manufacture of hats and bonnets of split straw, the large silver medal.
- Mr. T. Johnson, George-street, Glasgow, for his proposed use of charcoal as a material for draining, the large silver medal.
- Mr. Roger Brown, Sheffield, for his improvement in the electrical machine, the silver Isis medal.
- Mr. Geo. Edwards, Lowestoff-harbour-works, for an improved wind-gage, the large silver medal.
- Mr. F. S. Parkyn, Bedford-street, Bedford-row, for his instrument for drawing a perspective elevation from a given plan, the gold Isis medal.
- Thos. Tassell Grant, Esq., Weovil, for his machinery for making ship's-biscuit, the large gold medal.
- Mr. W. Pope, Ball-alley, Cornhill, for his sliding ship's compass, five pounds.

To Monsieur Hanriot Maçon, France, for his remontoire watch escapement, the large silver medal.

— Mr. J. Cuthbert, Brook-street, Lambeth, for his stand for a telescope, the large silver medal.

— Mr. J. Gray, Upper East-Smithfield, for his illuminator for a marine sextant, the large silver medal.

— Richard Greene, M.D., Cork, for his machine for grinding and polishing large specula and lenses, the large gold medal.

— Commander J. Pole, R.N., for his improved carriage for long pivot guns on board ship, the large silver medal.

— Capt. Lihou, R.N., for his improvements in ship's rudders, the large silver medal.

— Mr. W. Hookey, Prospect-place, Lower-road, Deptford, for his method of strengthening the top-sides and decks of ships, the large gold medal.

*In the Class of Polite Arts.*

## AMATEURS.

— Miss M. A. B. Rintoul, Southampton-street, Covent-garden, for a copy in chalk of a figure, the silver palette.

— Miss Ormsby Gore, Porkington, Oswestry, for a copy in chalk of figures, the silver Isis medal.

— Miss Louisa Aubert Pyne, Francis-street, Regent-square, for a copy in Indian ink of figures, the silver palette.

— Miss Mary Anne Kinton, Lamb's-Conduit-street, for a copy in Indian ink of figures, the large silver medal.

— Miss Mary Baker, George-street, Hanover-square, for a copy in chalk of a head, the silver Isis medal.

— Miss Francis Robertson, Worton-house, Isleworth, for a copy in chalk of a head, the silver palette.

— Miss Julia Knight, Portman-street, Portman-square, for a copy of a portrait, a miniature, the large silver medal.

— Miss Harris, Lamb's-Conduit-street, for a copy of a portrait, a miniature, the silver Isis medal.

— Miss Emily R. E. Pease, Plumstead-road, Woolwich, for a copy in pencil of a landscape, the silver Isis medal.

— Miss Leppingwell, Cadogan-house, Croydon, for a copy in water-colours of a landscape, the silver Isis medal.

— Miss Barron, Mecklenburgh-square, for a copy in water-colours of fruit, the silver Isis medal.

— Lord George Augustus Beauclerc, Worton-house, Isleworth, for a copy in pen and ink of heads, the silver palette.

— Mr. T. Goodwin Hatchard, Piccadilly, for a copy in sepia of animals, the silver Isis medal.

— Mr. S. C. T. Hanley, Worton-house, Isleworth, for a copy in pen and ink of a figure, the silver Isis medal.

— Miss Herbert, Cavendish-house, Clapham-common, for a drawing in water-colours of a landscape, the silver Isis medal.

To Mr. Benj. B. Wadham, Asylum for Deaf and Dumb, Kent-road, for a portrait in water-colours, the silver Isis medal.

— Mr. Douglas Morison, Datchet, near Windsor, for a drawing in pencil of a landscape, the silver Isis medal.

*Students in Architecture.*

— Mr. Hen. E. Kendall, Jun., Suffolk-street, Pall Mall East, for an original drawing of architectural foliage, the large silver medal.

— Mr. J. Johnson, Charlotte street, Blackfriars-road, for an original design for a royal naval school, the gold medallion.

— Mr. James Wilson, Welbeck-street, Cavendish-square, for an original design for an ornamented conservatory, the gold Isis medal.

— Mr. J. Taylor, Jun., Parliament-street, for a copy in sepia of an interior, the large silver medal.

*Artists.*

— Miss Eliza Owen Stanesby, Vivian-terrace, Chelsea, for a copy in chalk of a head, the silver Isis medal.

— Mr. Hen. Le Jeune, Greek-street, Soho, for a copy in Indian ink of a figure, the silver palette.

— Mr. Felix R. Roffe, Ossulston-street, Somers-town, for a copy in water-colours of figures, the large silver medal.

— Mr. Marshall Claxton, Claremont-terrace, Pentonville, for a copy in oil of a figure, the silver Isis medal.

— Mr. Charles Lucy, Broad-street, Bloomsbury, for a copy in oil of a portrait, the large silver medal.

— Mr. J. G. Croft, Kirby Lonsdale, Westmoreland, for a copy in oil of a figure, the silver Isis medal.

— Mr. J. Tatam Stanesby, Vivian-terrace, Chelsea, for a lithographic drawing of a figure, the silver Isis medal.

— Mr. Edmund Maguire, York-street, Covent-garden, for a lithographic drawing of a figure, the large silver medal.

— Miss Mary Rosenberg, Walcot-parade, Bath, for a painting in water-colours of flowers, the silver Isis medal.

— Master Oldmeadow, Bushy-heath, Herts, for an outline drawing from a figure, the silver Isis medal.

— Mr. Edward Henry Corbould, Crescent-place, Burton-crescent, for an historical painting in water-colours, the gold Isis medal.

— Mr. William Gush, Old Jewry, for a portrait in miniature, the gold Isis medal.

— Mr. Edward Frost, High-street, Wandsworth, for a portrait in oil, the gold Isis medal.

— Mr. T. Jennings, Gloucester-place, Kentish-town, for a finished engraving of a landscape, the large silver medal.

— Mr. W. Hurst, Amwell-street, Pentonville, for a portrait in oil, the large silver medal.

**New Patents**

**SE A L E D I N E N G L A N D,**

1834.

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To George Bather, of the Haymarket, in the parish of Saint James, Westminster, scale maker, for his invention of a weighing machine upon a new construction.—Sealed 22d May—6 months for enrolment.

To Thomas Edmonds, of Burton-street, in the parish of Saint George, Hanover-square, in the county of Middlesex, for his invention of a certain process or method of manipulation and treatment for the preparation of leather, whereby it becomes less pervious to water, and preserves its pliability better during use than does leather prepared by the ordinary means.—Sealed 22d May—6 months for enrolment.

To Joseph Morgan, of Manchester, in the county of Lancaster, pewterer, for his invention of certain improvements in the apparatus used in the manufacture of mould candles.—Sealed 22d May—6 months for enrolment.

To Charles Louis Stanislas Baron Heurteloup, of Holles-street, Cavendish-square, in the county of Middlesex, for his invention of improvements in certain parts of certain descriptions of fire-arms.—Sealed 22d May—6 months for enrolment.

To Andrew Smith, of Princes-street, Leicester-square, in the county of Middlesex, machinist and engineer, for his invention of a new and improved method of preparing phormium tenax, hemp, flax, and other fibrous substances, and rendering the same fit for hackling in the manufacture of linen, and for spinning in the manufacture of ropes, cordage, lines, and twines.—Sealed 24th May—6 months for enrolment.

To Luke Smith, of Manchester, in the county of Lancaster, cotton manufacturer, and John Smith, of Hepwood, in the same county, machine maker, for certain improvements in weaving machinery.—Sealed 24th May—6 months for enrolment.

To Philip Augustus De Chapeaurouge, of Fenchurch-street, in the city of London, gentleman, for a machine, engine, or apparatus for producing motive power, which he denominates a self-acting motive power, and called in France, by the inventor, voland moteur perpetual, being a communication from a foreigner residing abroad.—Sealed 24th May—6 months for enrolment.

To Stephen Hawkins, of Milton-house, near Portsmouth, in the county of Hants, gentleman, for his invention of certain improvements in warming pans, or apparatus for warming beds and other purposes.—Sealed 26th May—6 months for enrolment.

To John George Bodmer, of Bolton-le-Moors, in the county of Lancaster, civil engineer, for his invention of certain improvements in steam-engines and boilers, applicable both to fixed and locomotive engines.—Sealed 24th May—6 months for enrolment.

To John George Bodmer, of Bolton-le-Moors, in the county of Lancaster, civil engineer, for his invention of certain improvements in the construction of grates, stoves, and furnaces, applicable to steam-engines and many useful purposes.—Sealed 26th May—6 months for enrolment.

To William Crofts, of New Radford, in the county of Nottingham, for his invention of certain improvements in certain machinery for making lace, commonly called bobbin-net-lace.—Sealed 27th May—6 months for enrolment.

27 May x  
To William Henry Hornby, of Blackheath, in the county palatine of Lancaster, cotton-spinner and merchant, and William Kenworthy, of Blackburn, aforesaid, engineer, for their invention of certain improvements in power-looms to be used in the weaving of cotton, linen, woollen, and other cloths.—Sealed 27th May—6 months for enrolment.

To Richard Simpson, of Southampton-row, Bloomsbury, in the county of Middlesex, gentleman, for improvements in machinery for roving and slubbing cotton and wool, being a communication from a foreigner residing abroad.—Sealed 3d June—6 months for enrolment.

To John Bertie, of Basford, in the county of Nottingham, machinist, and James Gibbons, of Radford, in the same county, machinist, for their invention of an improved texture of the lace-net, hitherto called bobbin-net, or twist-net, and also certain improvements in lace machinery, in order to produce lace-net with the same improved texture, either plain or ornamented.—Sealed 5th June—6 months for enrolment. *5 22*

To George Saint Seger Grenfell, of Paris, in the kingdom of France, merchant, at present residing at Cadogan-place, Sloane-street, in the county of Middlesex, for certain improvements in the construction of saddles, being a communication from a foreigner residing abroad.—Sealed 5th June—6 months for enrolment.

To Edward Keele, of Titchfield, in the county of Southampton, brewer, for his invention of an improved valve and apparatus for close fermenting and cleansing porter, beer, ale, wine, spirits, cider, and all other saccharine and fermentable fluids.—Sealed 7th June—6 months for enrolment.

To Thomas Ridgway Bridson, of the township of Great Bolton, in the parish of Bolton-le-Moors, in the county of Lancaster, bleacher, for certain improvements in machinery or apparatus to be used in the operation of drying cotton, linen, and other similar manufactured goods, being a communication from a foreigner residing abroad.—Sealed 10th June—6 months for enrolment.

To James Whitaker, of Wardle, near Rochdale, in the county of Lancaster, flannel manufacturer, for his invention of certain improvements in engines used for carding wool.—Sealed 12th June—6 months for enrolment.

To Matthew Bush, of Dalmorarsh Printfield, near Bonhill, by Dumbarton, North Britain, calico printer, for his invention of certain improvements in machinery or appa-

ratus for drying and printing calicoes and other abrics.—Sealed 14th June—6 months for inrolment.

To James Lee Hannah, of Brighton, in the county of Sussex, doctor of medicine, for his invention of a certain improvement, or certain improvements in surgical instruments for reducing the stone in the bladder, and enabling the patient to pass it off through the urethra.—Sealed 16th June—6 months for inrolment.

To Joseph Jones, of Oldham, in the county palatine of Lancaster, cotton manufacturer, and Thomas Mellodew, of the same place, mechanic, for their invention of certain improvements in the construction of power-looms, and in the manufacture of certain kinds of corded fustian, or fabric to be woven in diagonal cords, from cotton, wool, and other fibrous materials.—Sealed 16th June—6 months for inrolment.

To Charles Wilson, of Kelso, in the county of Roxburgh, for his invention of certain improvements applicable to the machinery used in the preparation for spinning wool, and other fibrous substances.—Sealed 17th June—6 months for inrolment.

To Isaac Jeeks, junior, of Bennett's-hill, in the city of London, gentleman, for his invention of an apparatus, or machine, for putting or drawing on or off boots.—Sealed 17th June—6 months for inrolment.

To William Symington, of Bromley, in the county of Middlesex, cooper, and Andrew Symington, of Falkland, in Fifeshire, in that part of the United Kingdom called Scotland, watchmaker, for their invention of a paddle wheel of a new and useful construction, for the propulsion of vessels and other motive purposes.—Sealed 23d June—6 months for inrolment.

To John Chester Lyman, of Golden-square, in the county of Middlesex, gentleman, for certain improvements in hulling, cleansing, and polishing rice, bearding or peeling barley, and hulling and cleansing coffee, being a communication from a foreigner residing abroad.—Sealed 24th June—6 months for inrolment.

## CELESTIAL PHENOMENA, FOR JULY, 1834.

D.	H.	M.		D.	H.	M.	
1			Clock before the ☽ 3 m. 20 s.				Occul. ξ <sup>3</sup> in Libra im. 11h. 8m.
—			☽ passes the mer. 20 h. 18 m.				Occul. ξ <sup>4</sup> in Libra im. 12 h.
6	9		♂ in conj. with the ☽ diff. of dec. 2. 52. N.				21 m.
2	17		☽ in Apogee.	16	7	47	☽ in Aphelion.
3	0	48	♀ in conj. with the ☽ diff. of dec. 1. 32. N.	10			♀ in conj. with α in Leonis.
5			Clock before the ☽ 4 m. 5 s.	12			☽ in oppos. to the ☽
—			☽ passes the mer. 23 h. 43 m.	20			Clock before the ☽ 5m. 57s.
6	9	13	Ecliptic conj. or ☽ new moon.	—			☽ passes the mer. 12 h. 19 m.
6	4	31	☽ in the descending node.	7	16		Ecliptic oppo. or ☽ full moon.
7			Mer. R. A. 8 h. 54 m. dec.	21	17	2	☽ stationary.
			17. 18. N.	22	9	51	☽ in conj. with the ☽ diff.
—			Ven. R. A. 9 h. 15 m. dec.				of dec. 3. 51. N.
			17. 43. N.	23			Clock before the ☽ 6 m. 8s.
—			Mars R. A. 2 h. 46 m. dec.	—			☽ passes the mer. 16 h. 9 m.
			14. 53. N.	26	13		☽ in Apogee.
—			Vesta R. A. 3 h. 1 m. dec.	11			11. ♀'s third sat. will im.
			10. 50. N.	27			Mer. R. A. 9 h. 15 m. dec.
—			Juno R. A. 19 h. 39 m. dec.				11. 17. N.
			4. 12. S.	—			Ven. R. A. 10 h. 47 m. dec.
—			Pallas R. A. 10 h. 53 m. dec.				9. 8. N.
			12. 19. N.	—			Mars R. A. 3 h. 42 m. dec.
—			Ceres R. A. 11 h. 12 m. dec.				18. 43. N.
			14. 57. N.	—			Vesta R. A. 3 h. 29 m. dec.
—			Jup. R. A. 3 h. 59 m. dec.				12. 16. N.
			19. 43. N.	—			Juno R. A. 19 h. 23 m. dec.
—			Sat. R. A. 12 h. 21 m. dec.				5. 31. S.
			0. 18. N.	—			Pallas R. A. 11 h. 28 m. dec.
—			Georg. R. A. 21 h. 54 m. dec.				11. 10. N.
			13. 33. S.	—			Ceres R. A. 11 h. 40 m. dec.
—			☽ passes the mer. 1 h. 54 m.				11. 9. N.
—			☽ passes the mer. 2 h. 15 m.	—			Jup. R. A. 4 h. 14 m. dec.
—			♂ passes the mer. 19 h. 45 m.				20. 25. N.
—			♀ passes the mer. 20 h. 56 m.	—			Sat. R. A. 12 h. 26 m. dec.
14	1	1	♀'s first sat. will im.				0. 15. S.
8	8	7	☽ in conj. with the ☽ diff. of dec. 4. 16. S.	—			Georg. R. A. 21 h. 52 m. dec.
18	23		♀ in conj. with the ☽ diff. of dec. 2. 29. S.				13. 47. S.
10			Clock before the ☽ 4 m. 54 s.	—			☽ passes the mer. 0 h. 57 m.
—			☽ passes the mer. 3h. 29 m.	—			☽ passes the mer. 2 h. 28 m.
11	12		♂ in Perigee.	—			♂ passes the mer. 19 h. 22 m.
12	0	47	☿ in conj. with the ☽ diff. of dec. 3. 3. S.	—			♀ passes the mer. 19 h. 53 m.
13	5	15	☽ in ☐ or first quarter.	28	7	7	☽ in ☐ or last quarter.
15			Clock before the ☽ 5m. 32s.	29	5		♀ in conj. with χ in Leonis,
—			☽ passes the mer. 7h. 42 m.				diff. of dec. 0. 9. N.
			Occul. ξ in Libra im. 9 h.	30	7	23	♂ in conj. with the ☽ diff. of dec. 1. 27. N.
			25 m.	14	11		♀'s first sat. will im.
				19	53		♀ in conj. with the ☽ diff. of dec. 0. 58. N.

## METEOROLOGICAL JOURNAL,

FOR MAY AND JUNE, 1834.

1834.	Thermo.		Barometer.		Rain in in- ches.	1834.	Thermo.		Barometer.		Rain in in- ches.
	Hig.	Low.	Hig.	Low.			Hig.	Low.	High.	Low.	
May.						June.					
26	69	37	30,24	Staty.		11	68	46	29,64	29,63	
27	69	39	30,21	30,18		12	60	47	29,62	Staty.	,525
28	68	42	30,13	30,11		13	64	39	29,66	29,64	,2
29	67	35	30,10	30,09		14	67	45	29,48	29,47	,05
30	70	39	30,07	30,06		15	68	48	29,61	29,52	,1
31	69	43	30,12	30,08		16	65	43	29,60	29,50	
June.						17	65	42	29,66	29,53	,1
1	77	49	30,24	30,17		18	67	46	29,85	29,79	
2	80	50	30,19	30,10		19	78	49	29,89	29,80	,025
	70	48	29,99	Staty.		20	81	51	29,71	29,69	
4	65	41	29,95	29,78		21	85	54	29,71	29,66	
5	69	40	29,89	29,76	,275	22	75	57	29,98	29,79	,275
6	69	42	30,06	30,00		23	76	49	30,27	30,23	
7	69	43	29,98	29,29		24	75	46	30,29	Staty.	
8	72	41	29,86	29,81		25	71	47	30,25	30,17	
9	62	40	29,74	29,70							
10	69	49	29,66	29,64							

*Thunder Storm.*—On the evening of the 14th, from half-past six till near nine, we were visited by a heavy thunder storm, the greatest violence of which was felt eastward of this place; it was accompanied by heavy rain, and for a few minutes only by hail, or rather large pieces of ice, of an extraordinary size, many of them measuring two inches and a quarter round; others were very much angulated. From nine till after midnight, the lightning presented a highly interesting sight, issuing in almost incessant flashes from E. by S. to N.W. Flashes were frequently seen from several points at nearly the same time: it was acknowledged by all who had the opportunity of seeing it, to be one of the grandest sights ever witnessed by them.

Edmonton.

CHARLES HENRY ADAMS.

Latitude 51° 37' 32" N.

Longitude 3° 51' West of Greenwich.

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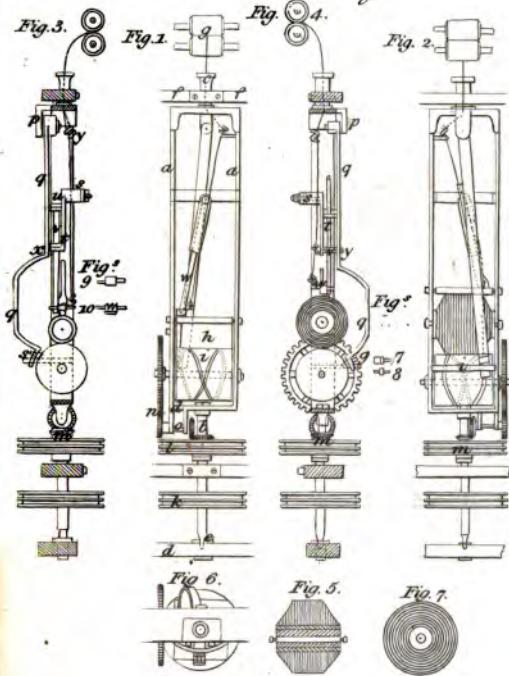
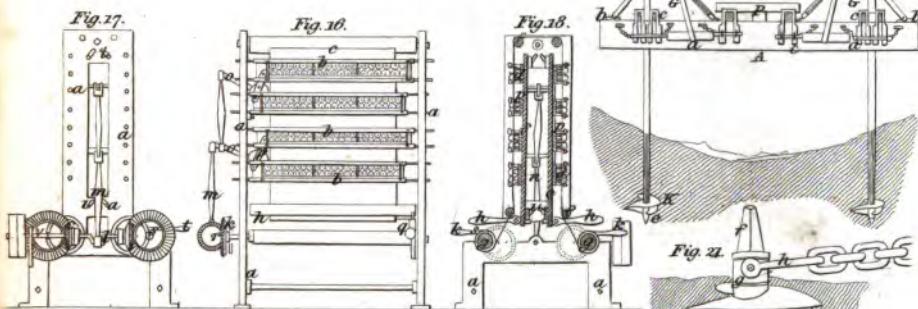
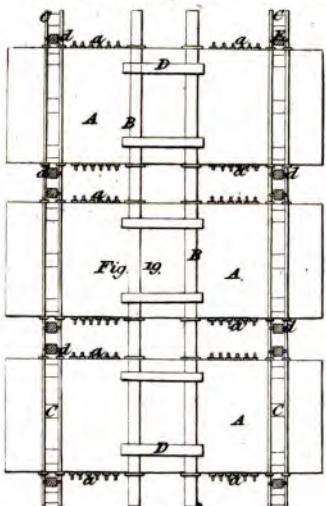
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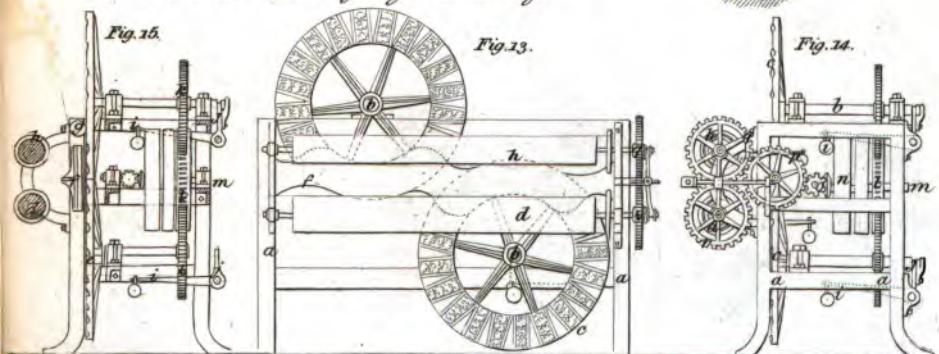
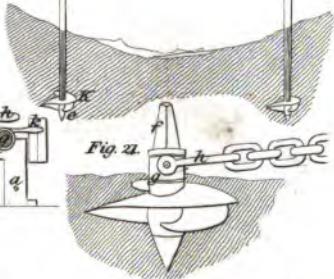
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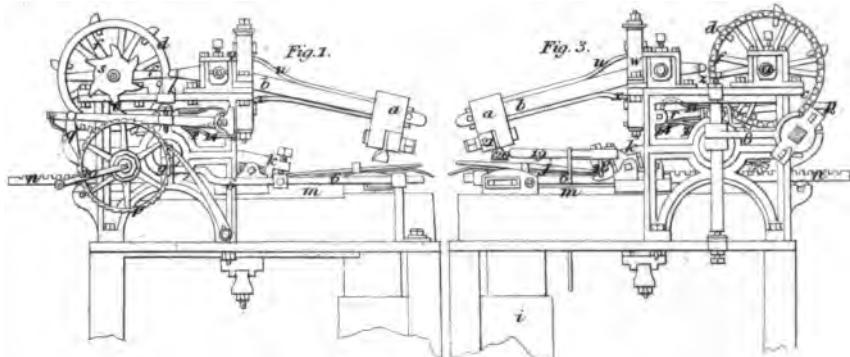
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Newton's Imp<sup>o</sup> in RovingMitchell's Imp<sup>o</sup> in Docks

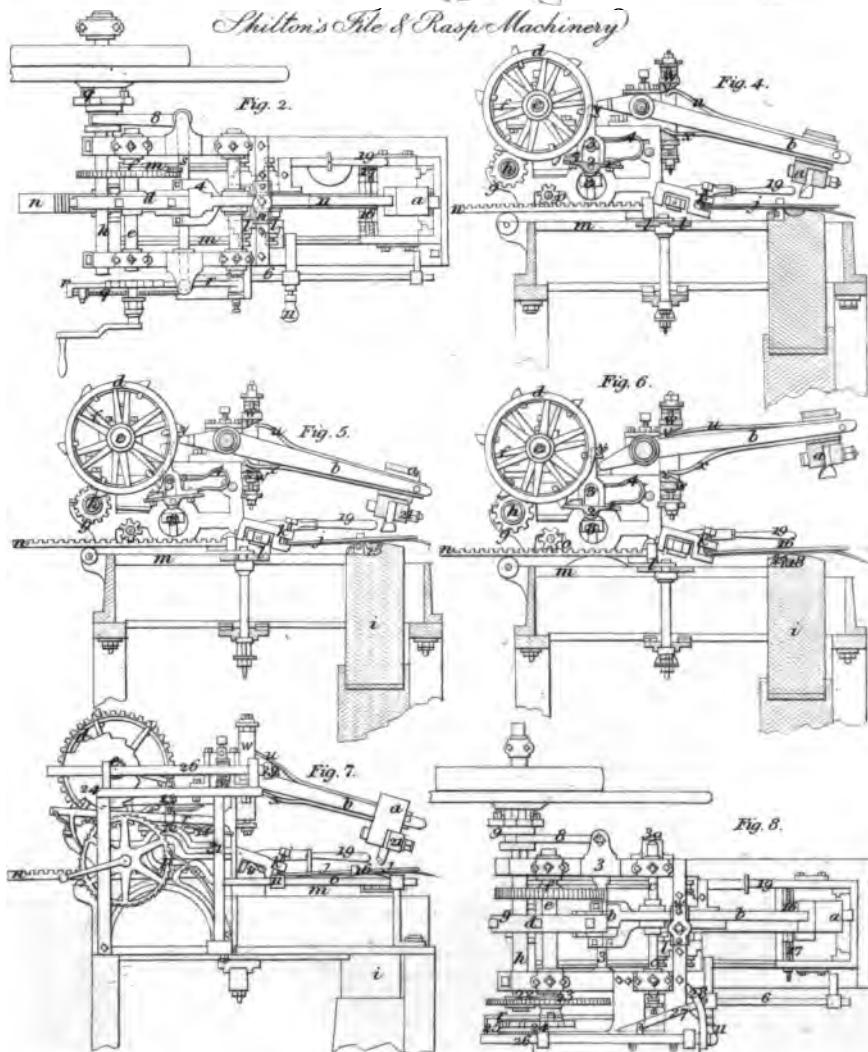
## Oldland's Cloth Dressing Machinery







Shilton's File &amp; Rasp Machinery





Bate's Wool Combing  
Machinery

## Kitchen's Printing Press

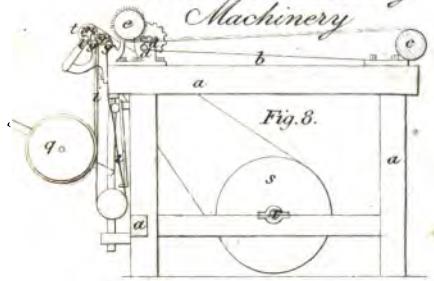


Fig. 8.

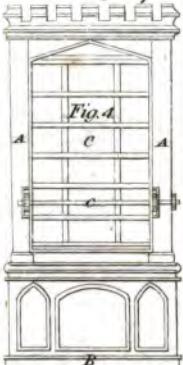


Fig. 4.

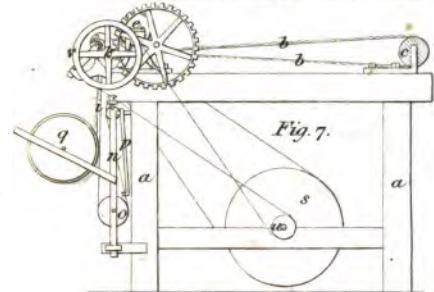


Fig. 7.

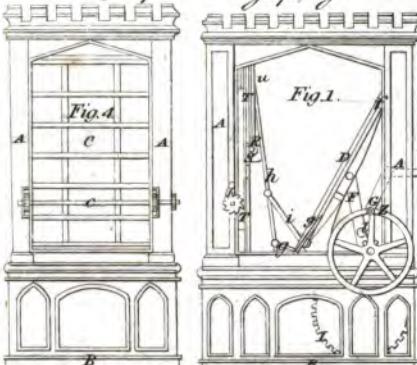


Fig. 1.

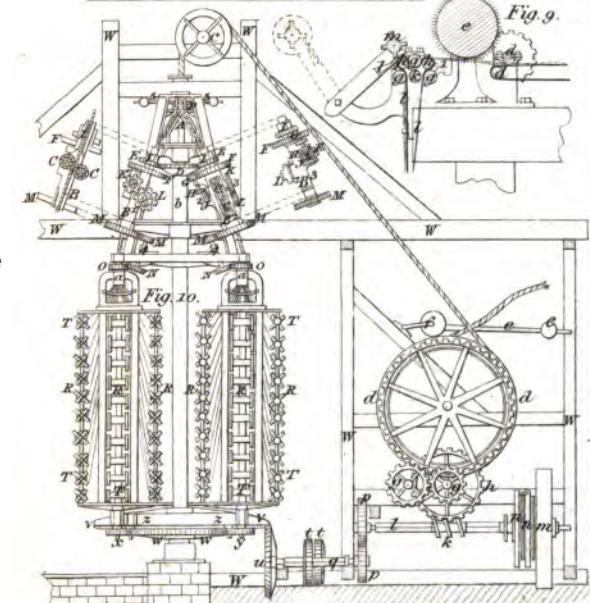


Fig. 10.

Fig. 3.

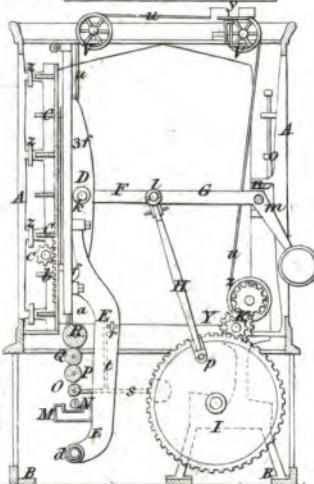


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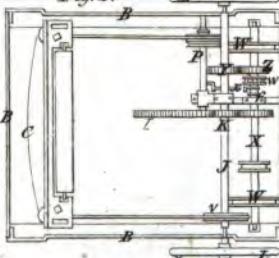


Fig. 11.

## Norvell's Rope Machinery

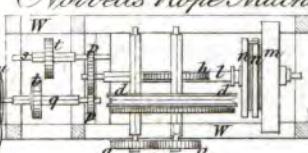
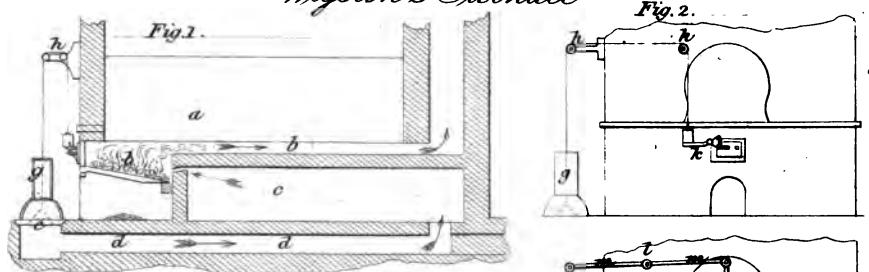
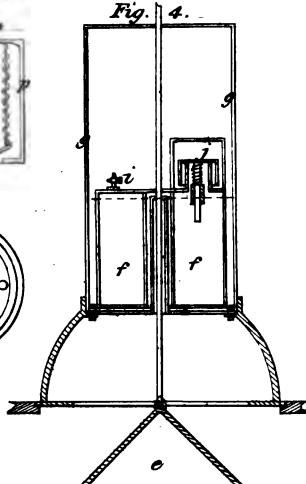
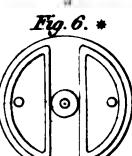
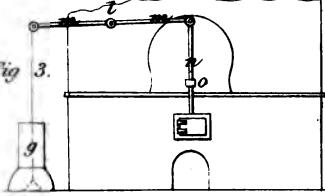
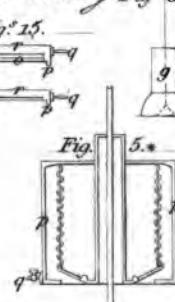
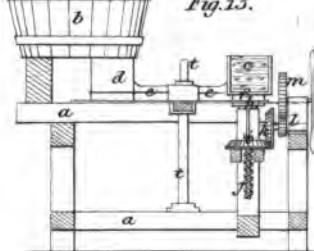


Fig. 5. Fig. 6.





Bearts File Machinery Fig  
Fig. 13. Fig. 15.



# Schawbe's Printing & Weaving Machinery

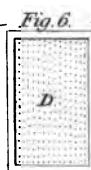
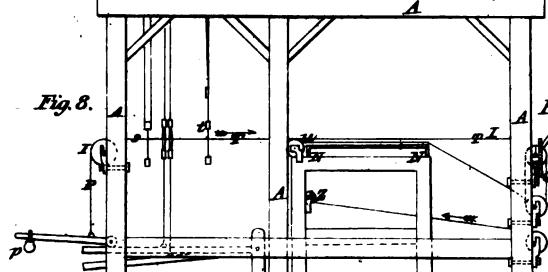


Fig. 10.

W. Newton Del't

1 March 1834.

T. Phillibrown Scap.



## Dr. Ure on Sugar Refining

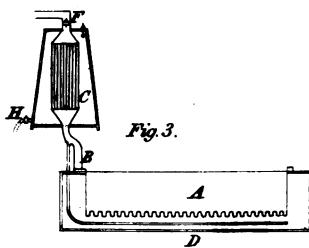


Fig. 3.

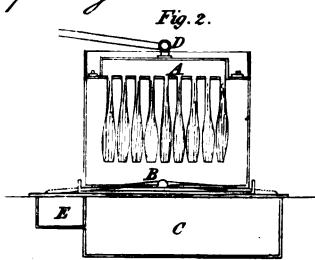
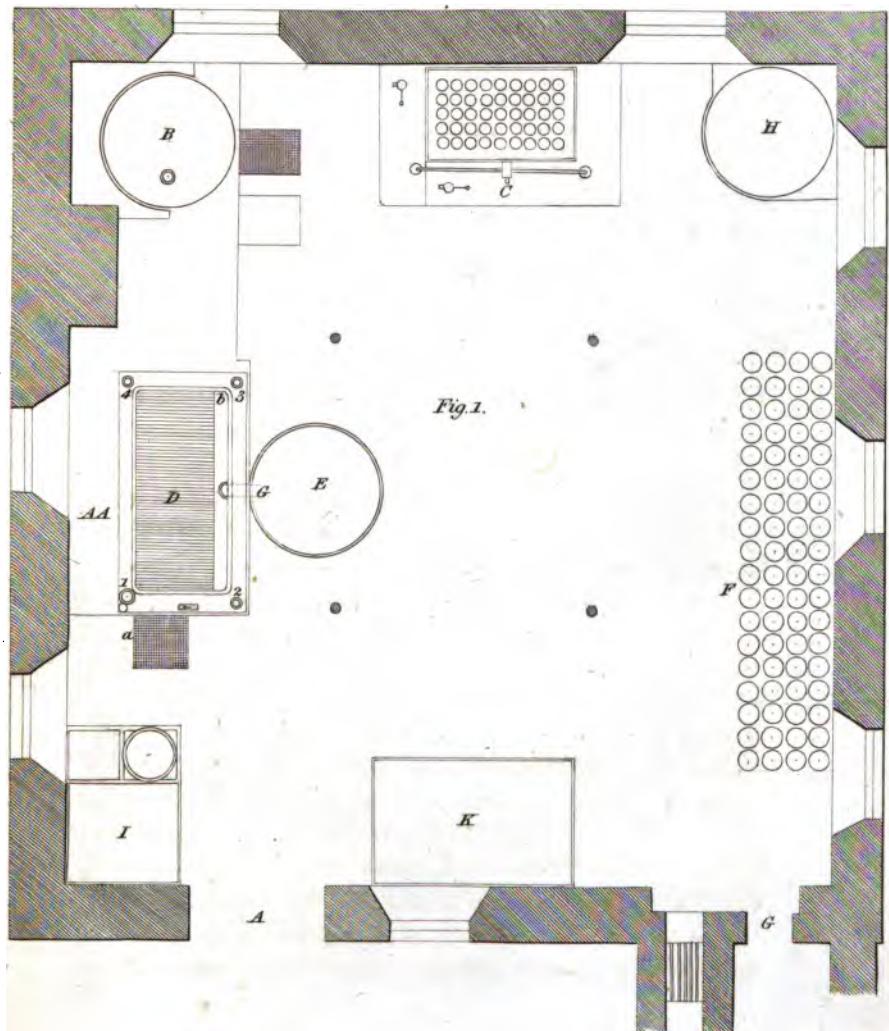


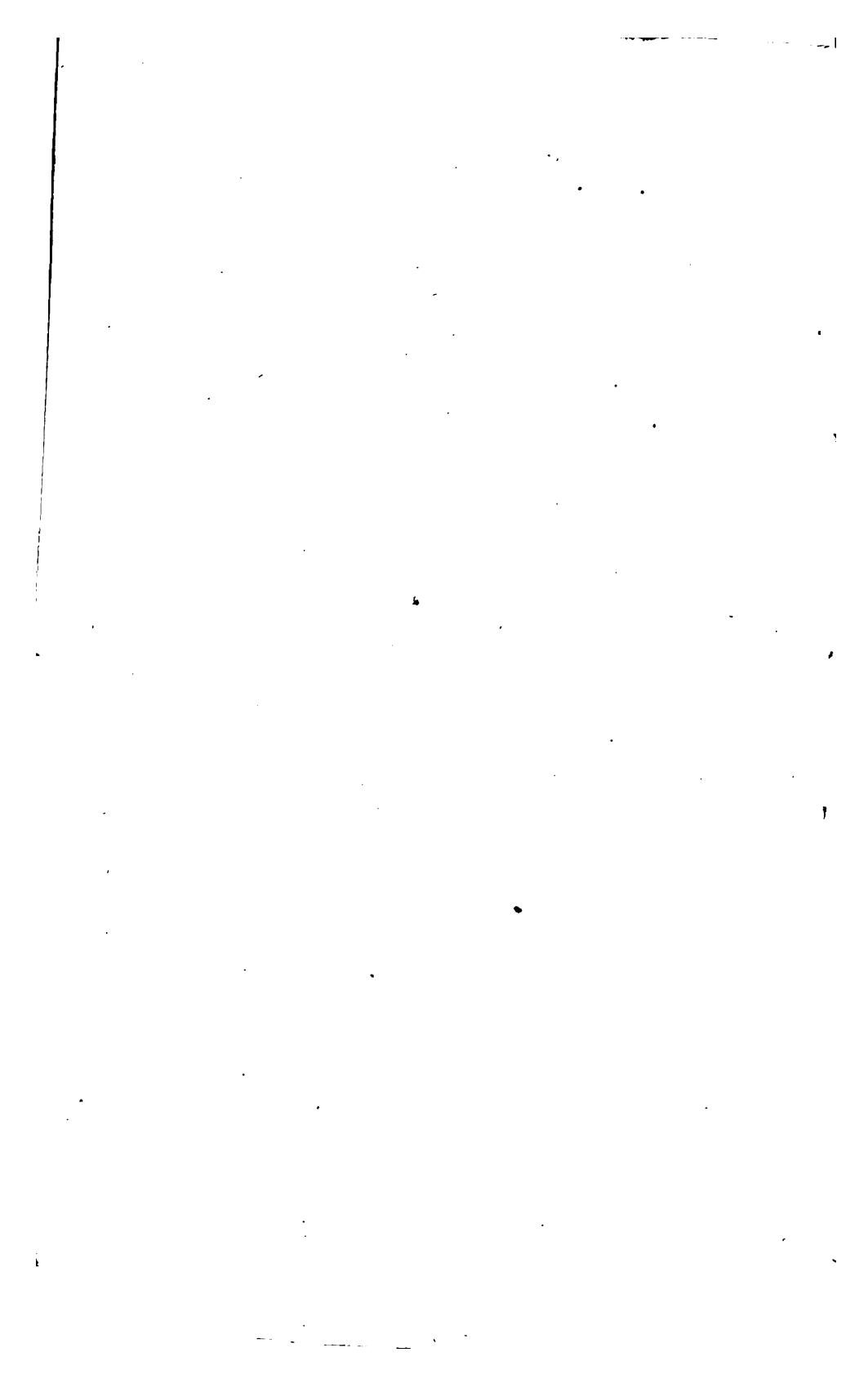
Fig. 2.



1. March 1834.

W. Newton Del.

F. Yates Scap.



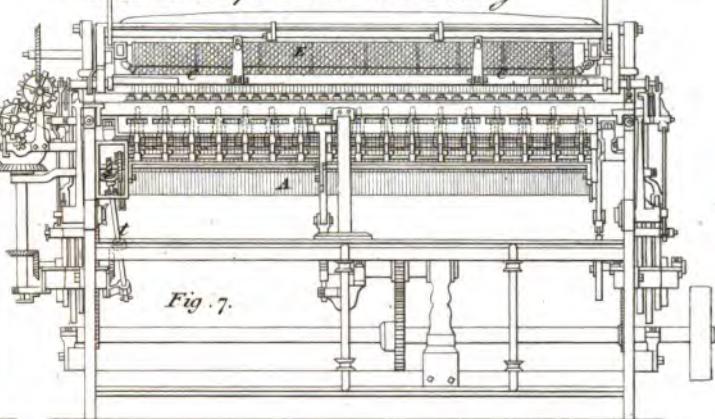
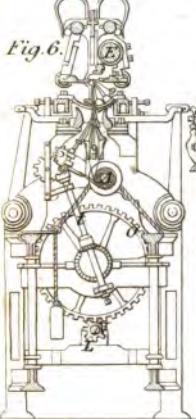


Fig. 7.

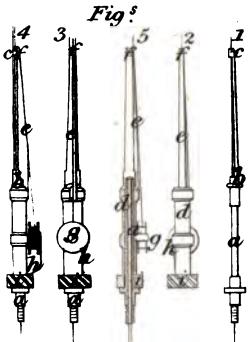


Fig. 8.

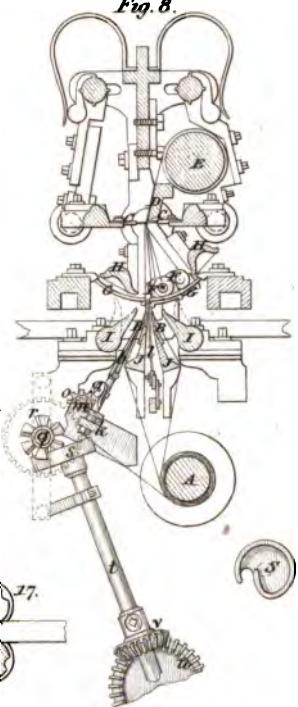


Fig. 9.

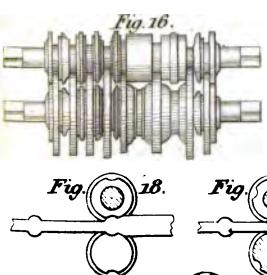
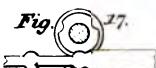
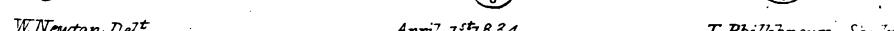
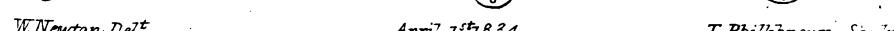
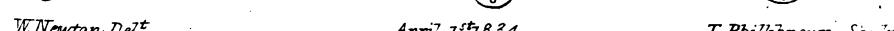
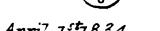
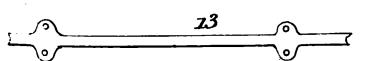
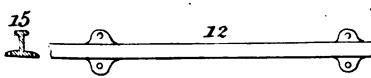
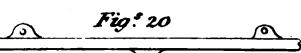
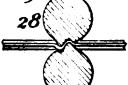
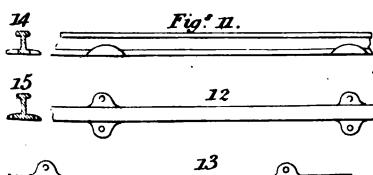


Fig. 10.

Smith & Walkinshaw's Imp.<sup>d</sup> Railways



Westley's Patent Drawing Machinery

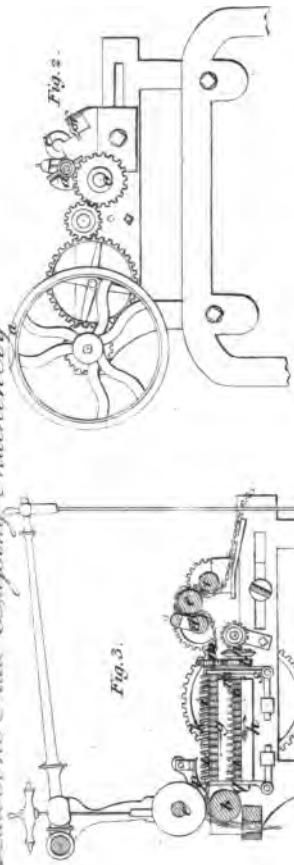
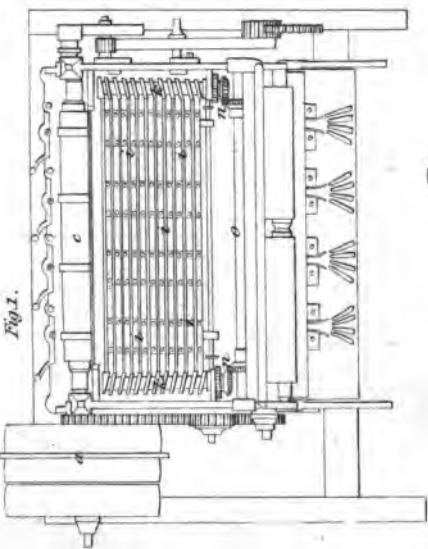


Fig. 3.

Parlour's Improved Table Lamp

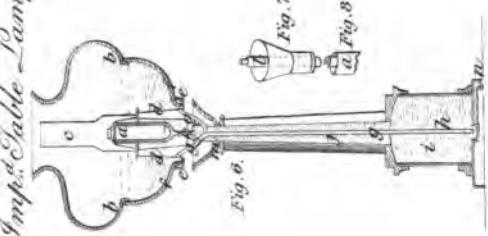
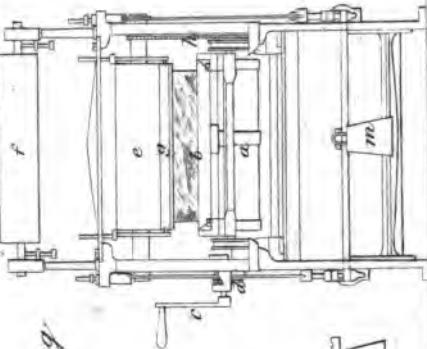
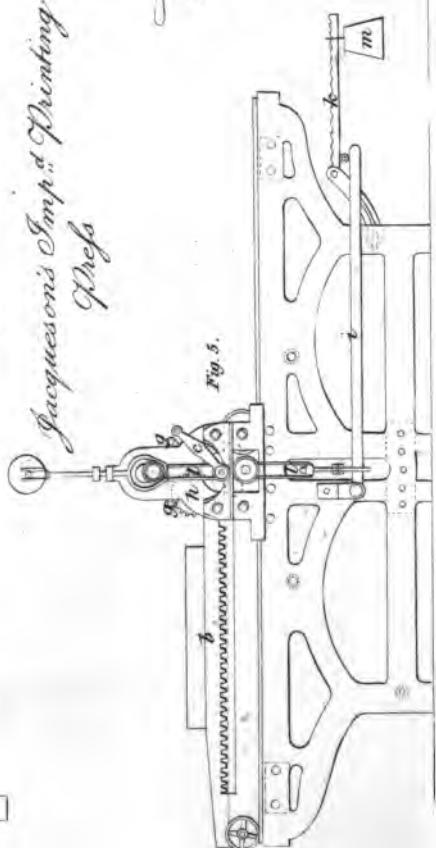


Fig. 4.



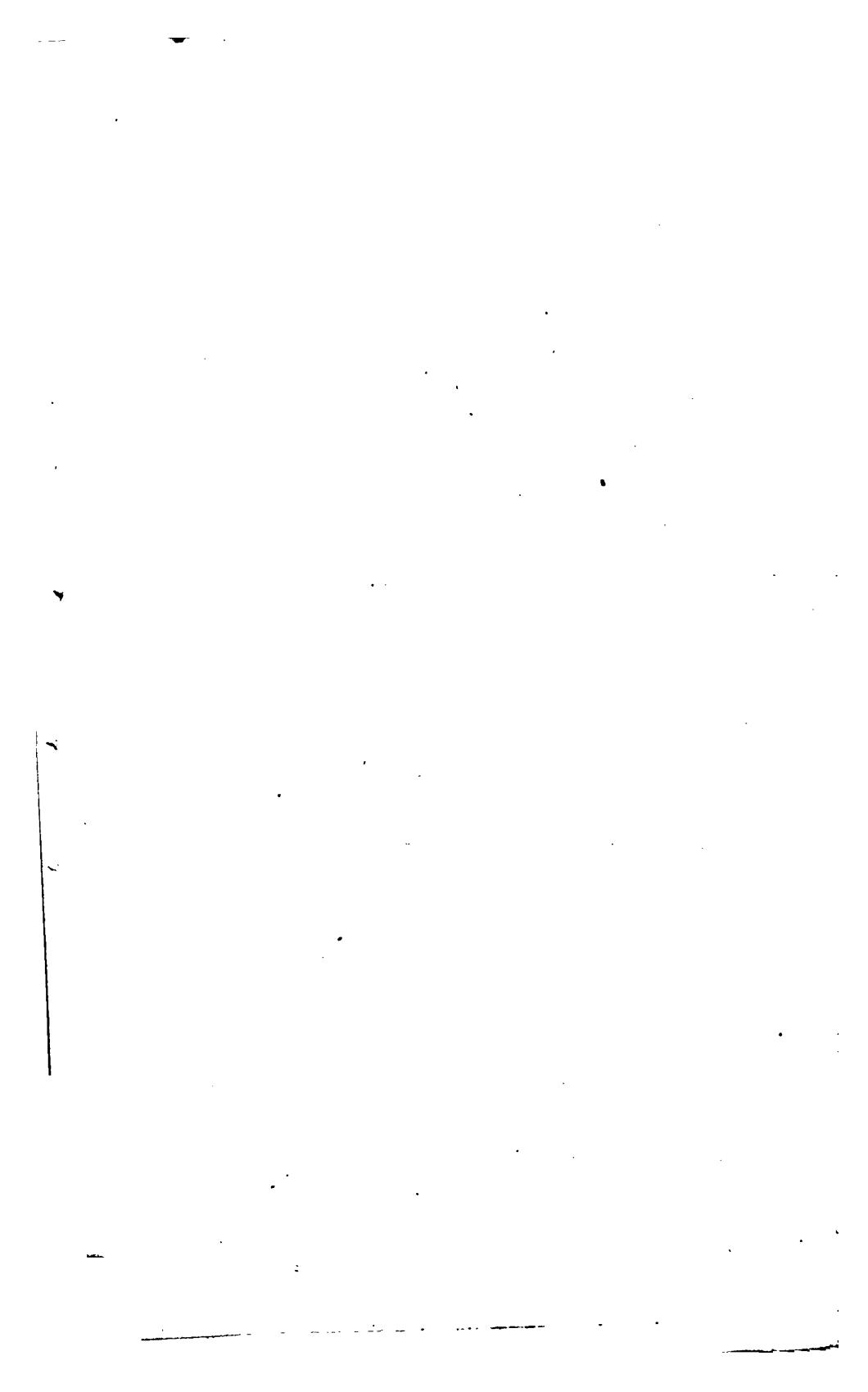
Auguerson's Improved Printing Press



N. Newton, Del.

April 21: 1834.

F. Mansell Sculp.



## Newton's Evaporating Apparatus

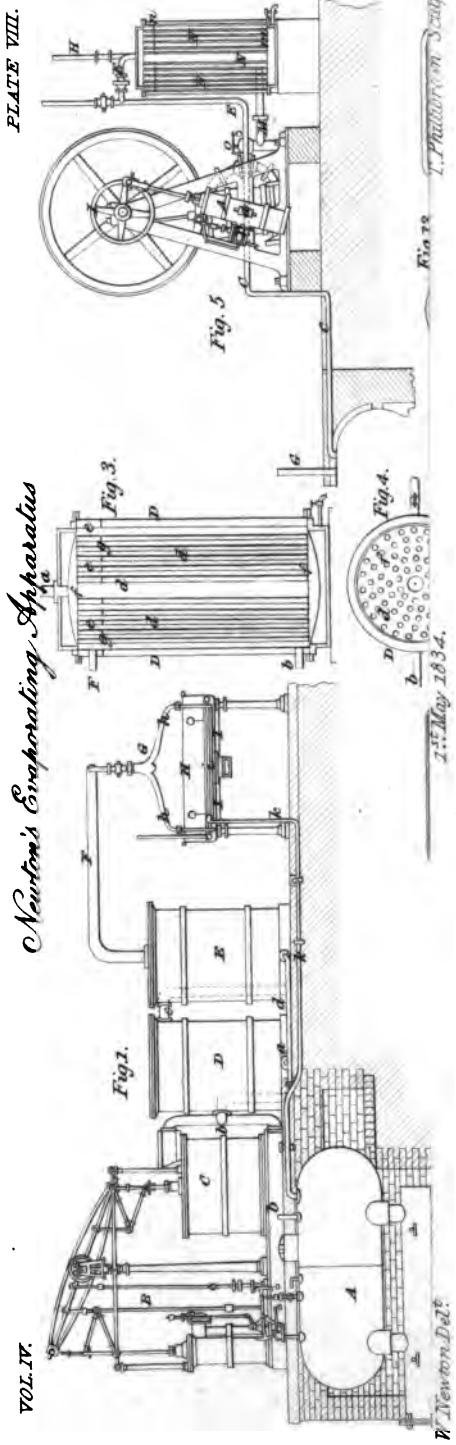
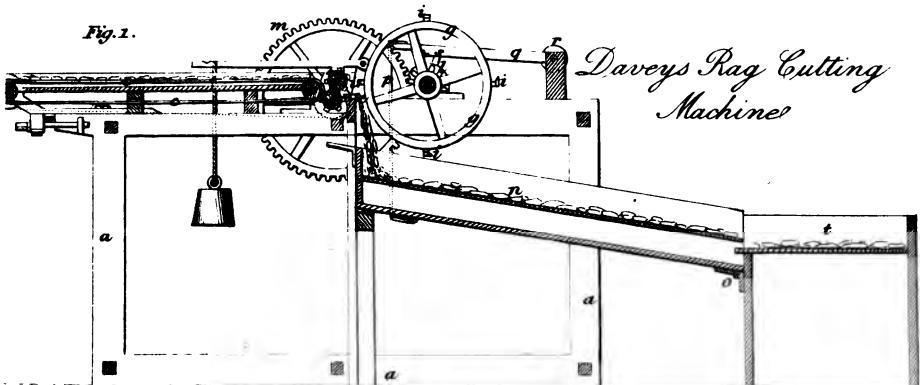


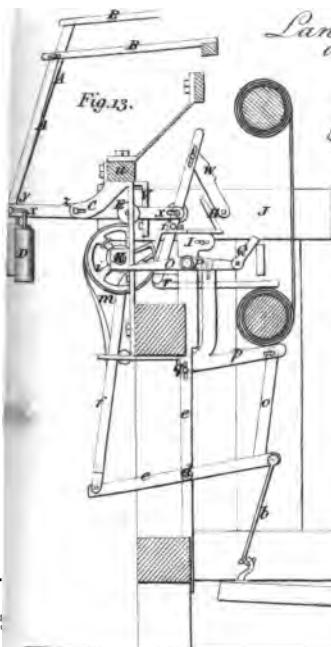


Fig. 1.



Davey's Rag Cutting Machine

Fig. 13.



Langham's Lace Machine

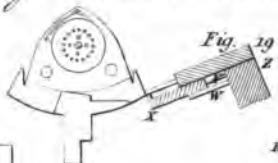
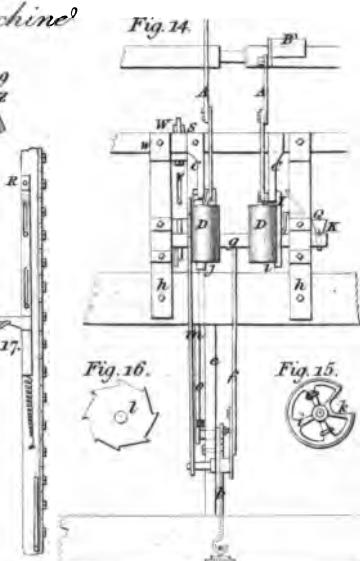
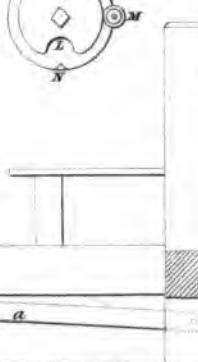
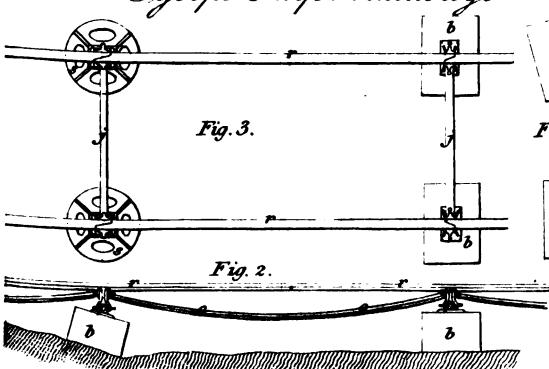
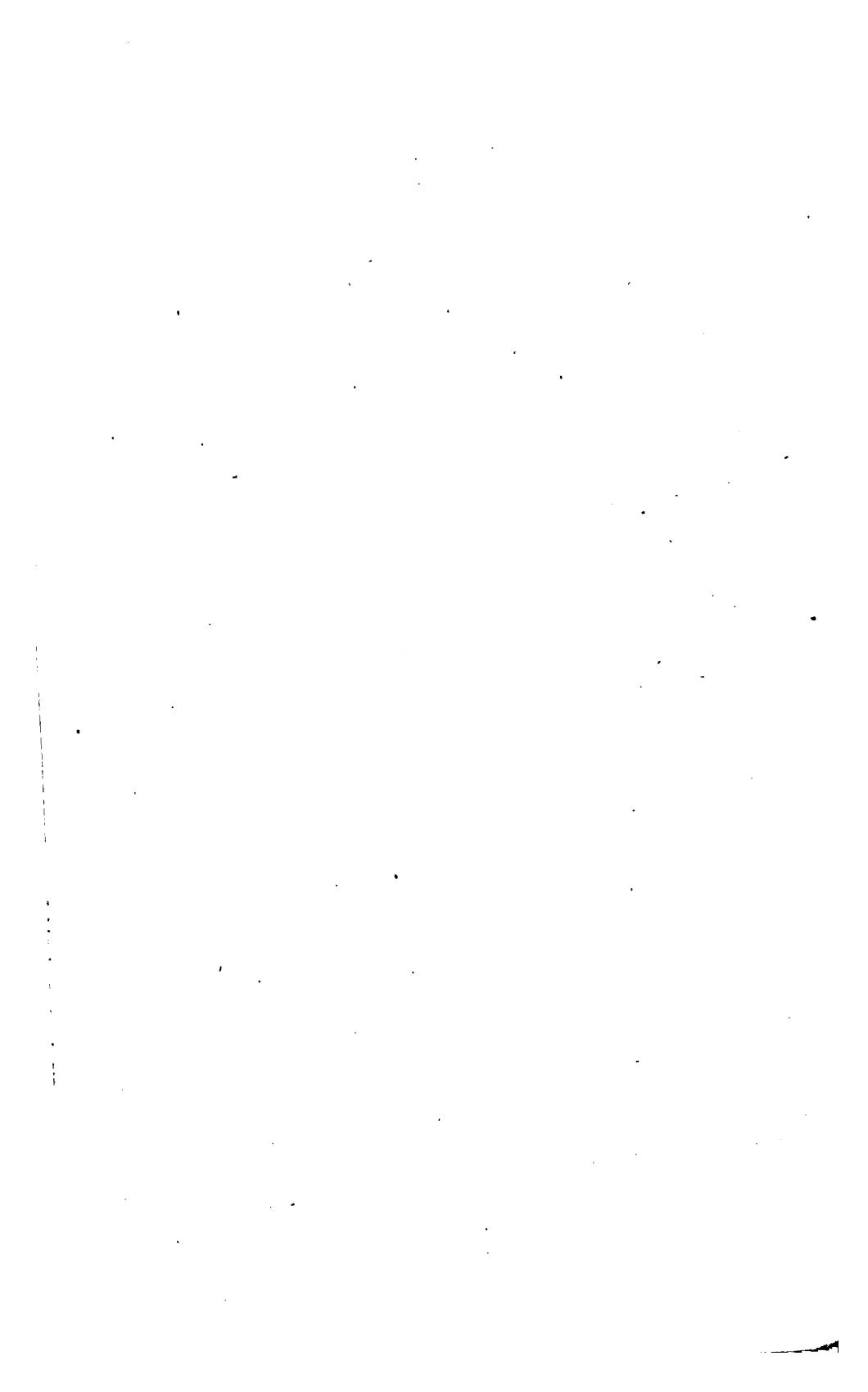
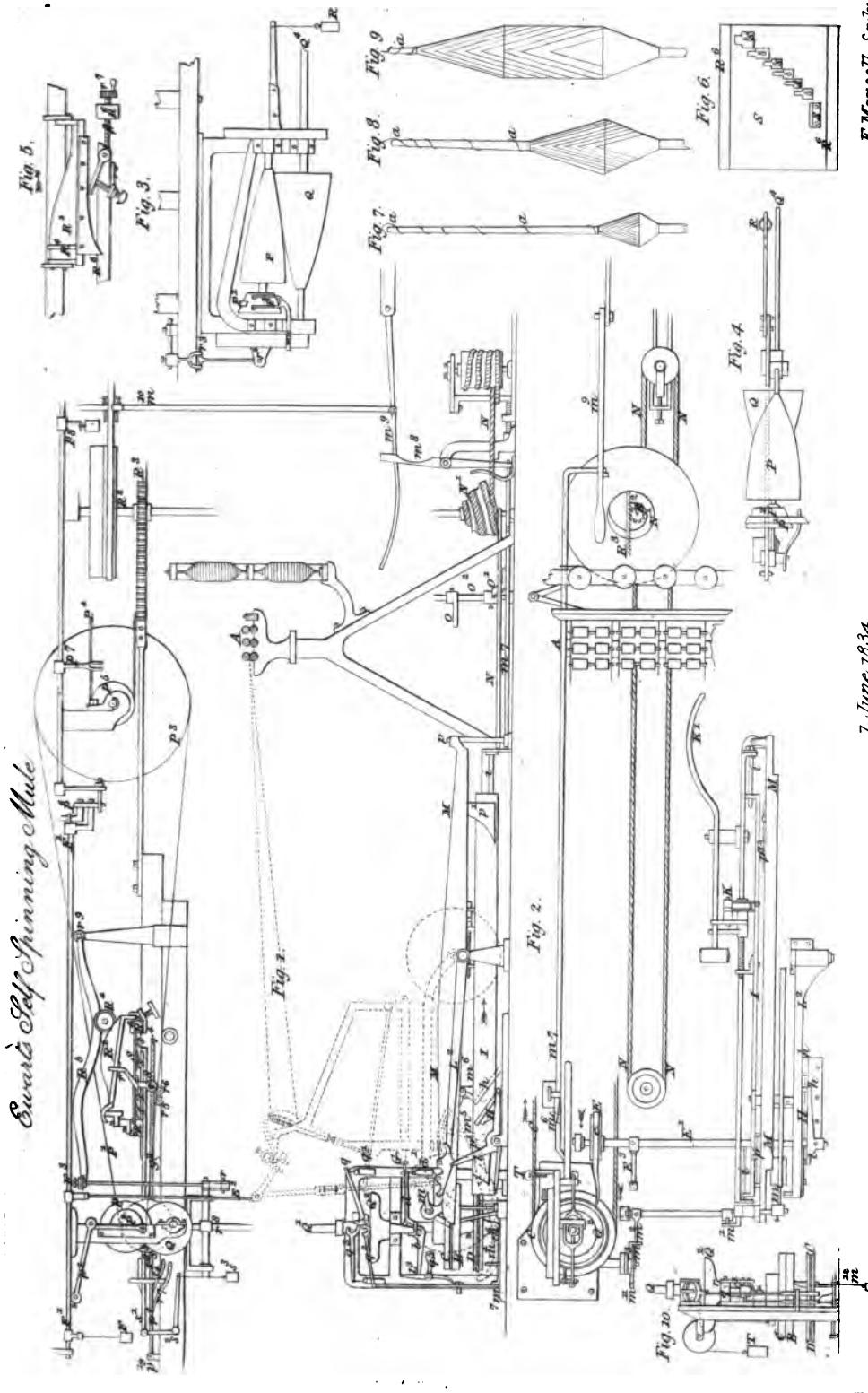


Fig. 18.

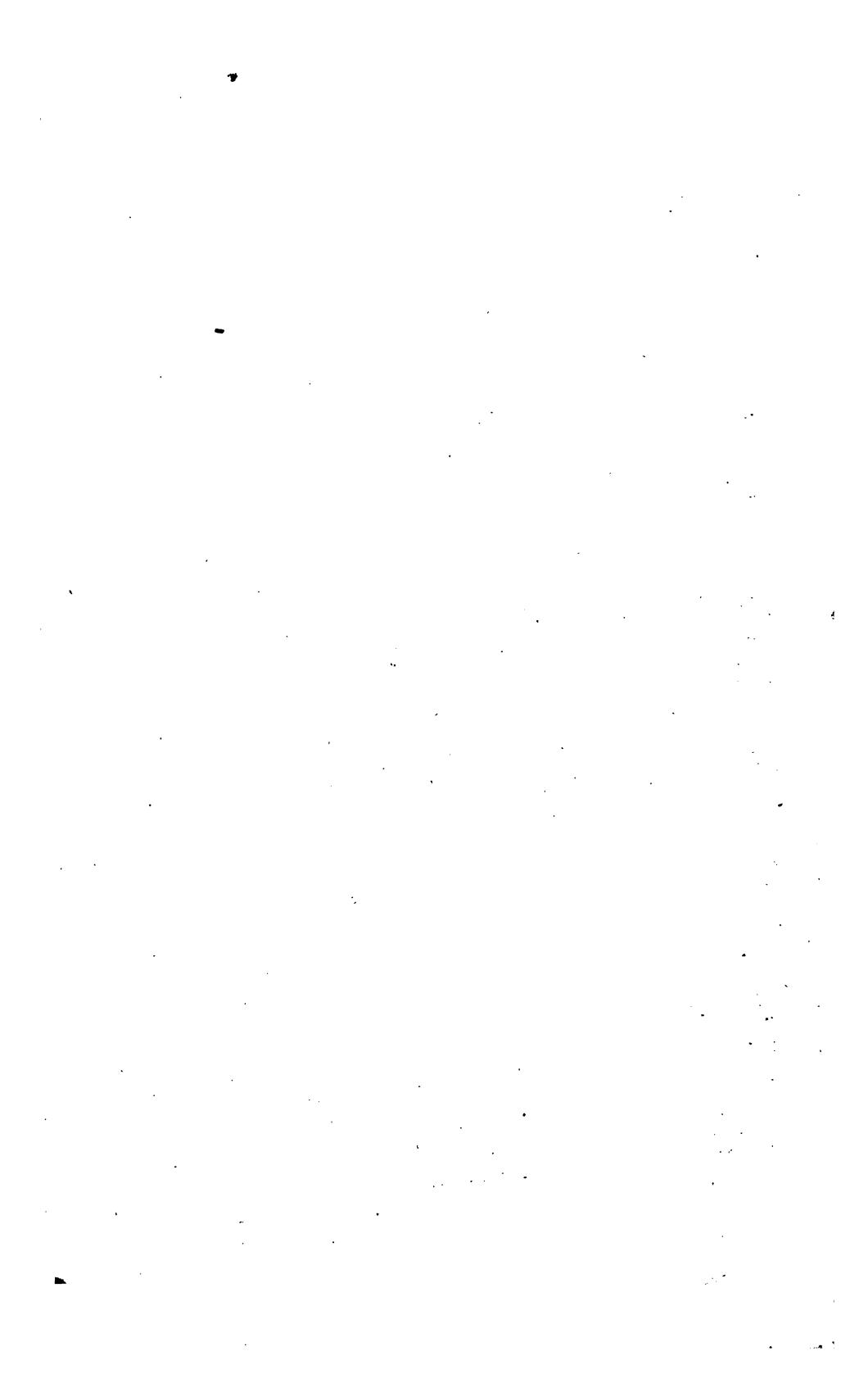
Icsope's Imp.<sup>d</sup> Railways



Evans's Self Spinning Mill



7. June 1834.



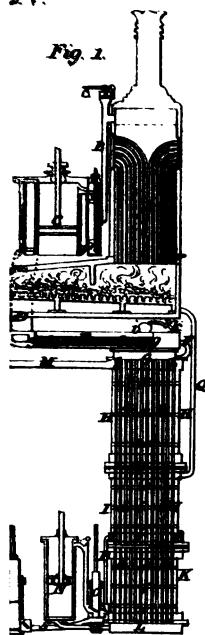


Fig. 1.

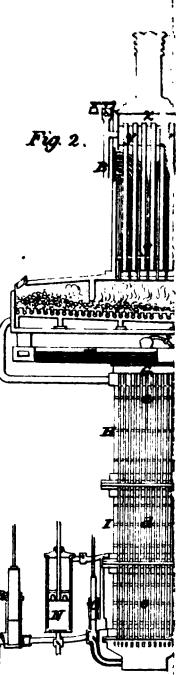


Fig. 2.



Fig. 5.

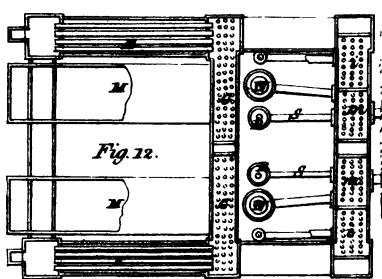


Fig. 12.

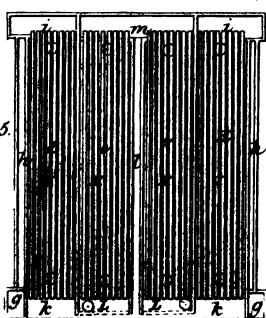
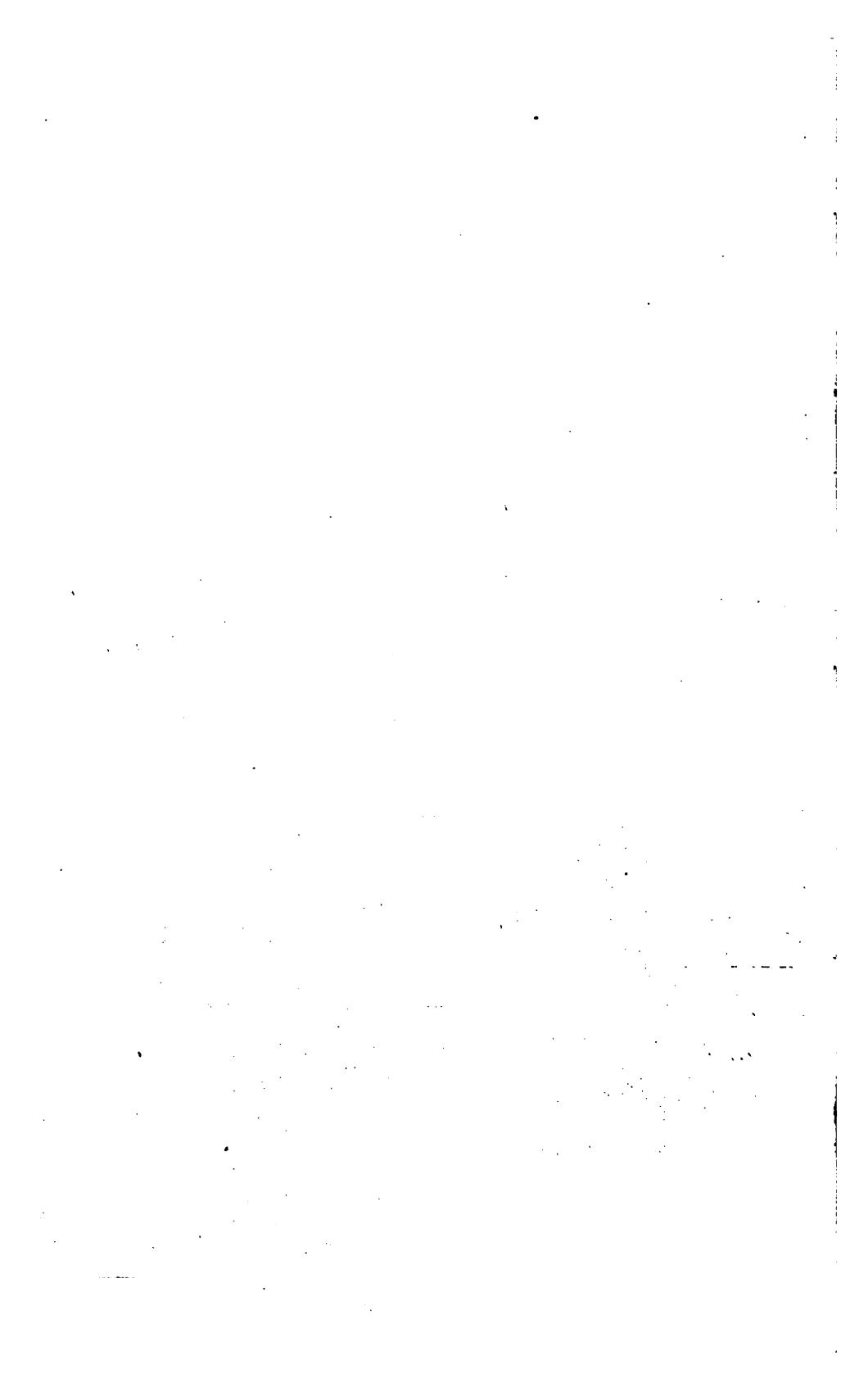
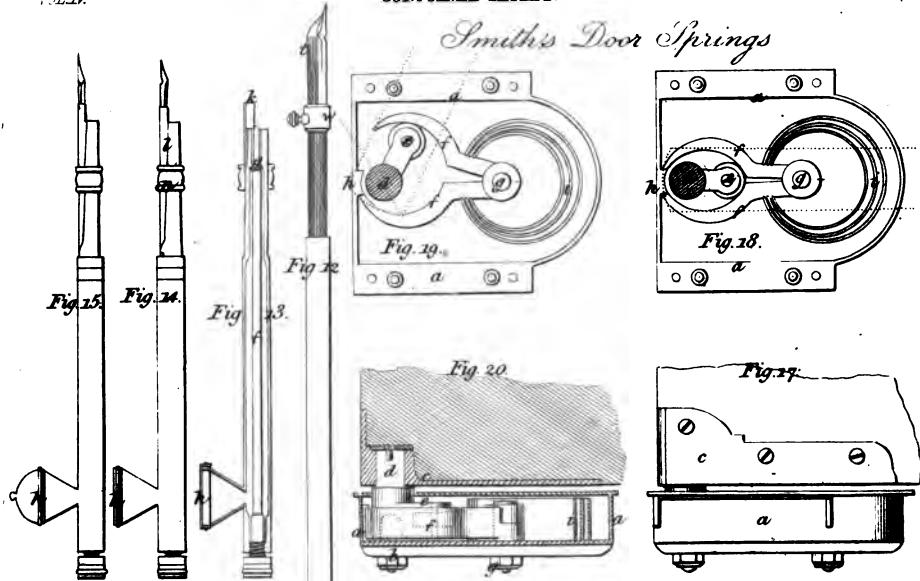


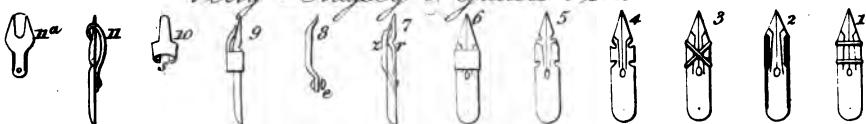
Fig. 15.



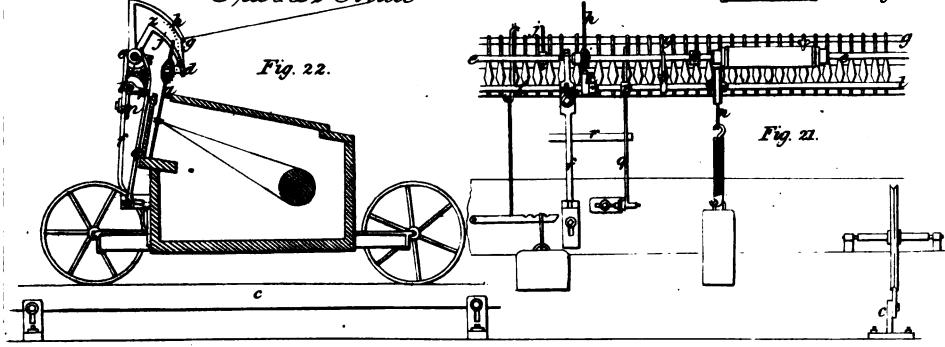
## Smith's Door Springs



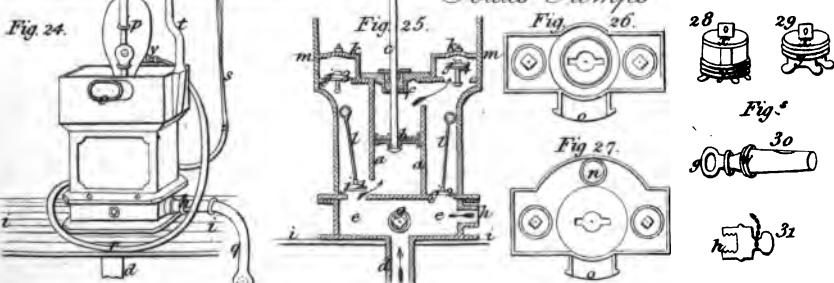
## Perry, Masey &amp; Gauci's Pens



## Travis's Mule



## Todds Pumps





## Sifflecks Apparatus For Deepening Shallows.

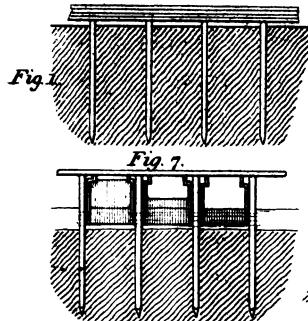


Fig. 1.



Fig. 2.

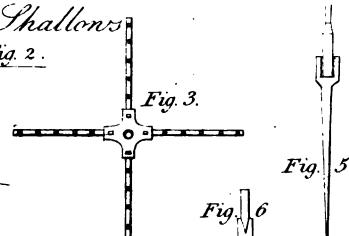


Fig. 3.

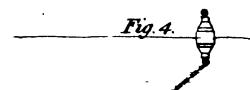


Fig. 4.

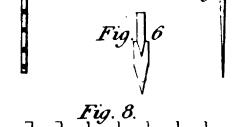


Fig. 5.

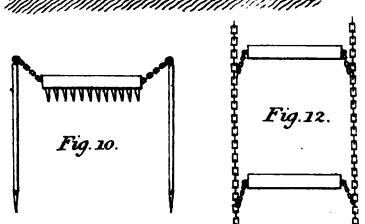


Fig. 6.

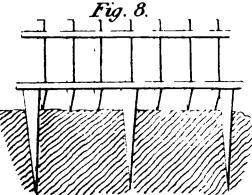


Fig. 8.

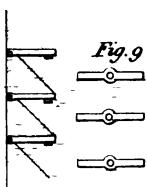


Fig. 9.

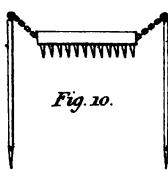


Fig. 10.



Fig. 12.

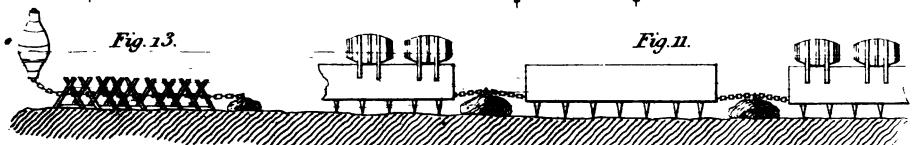


Fig. 13.

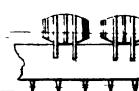


Fig. 11.



Fig. 14.

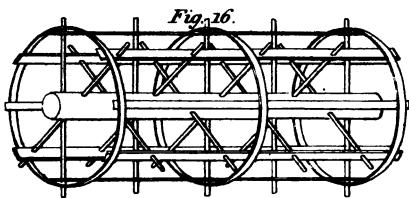


Fig. 16.

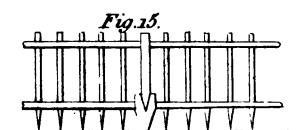


Fig. 15.

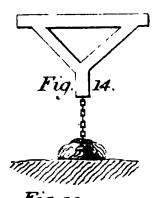


Fig. 17.

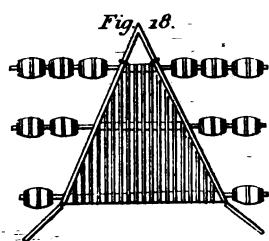


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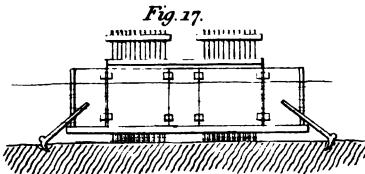
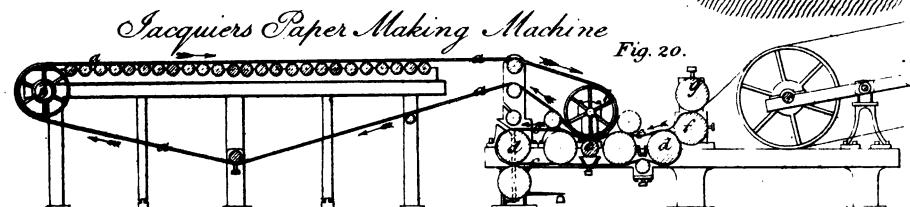
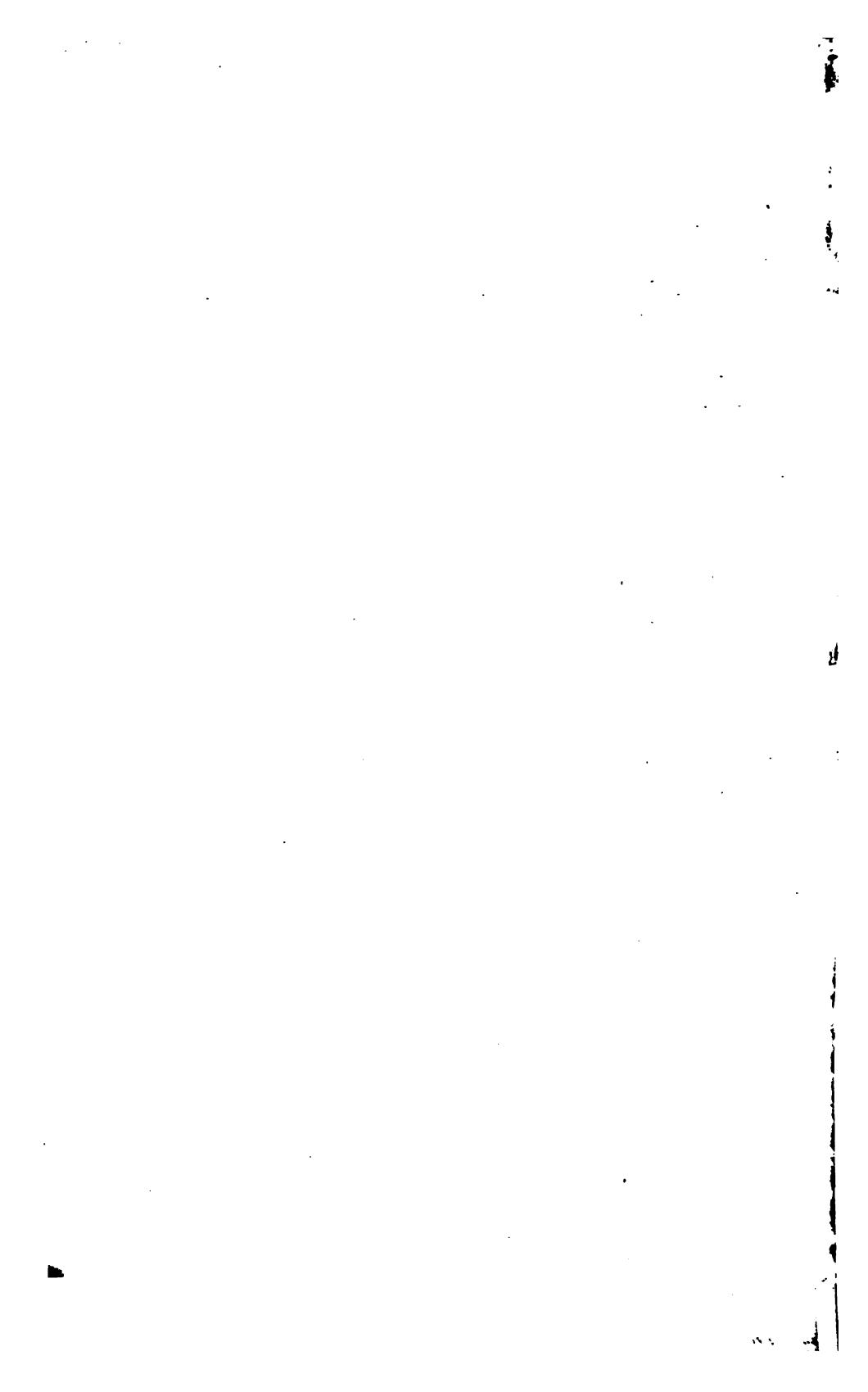


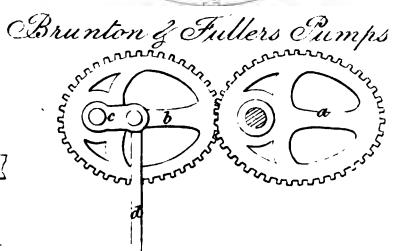
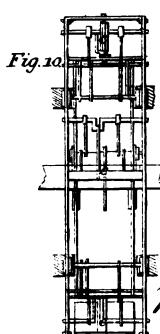
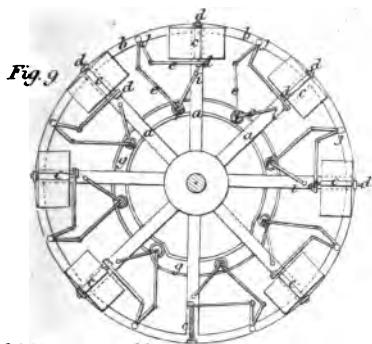
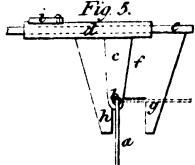
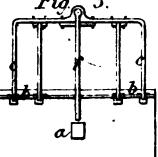
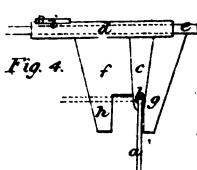
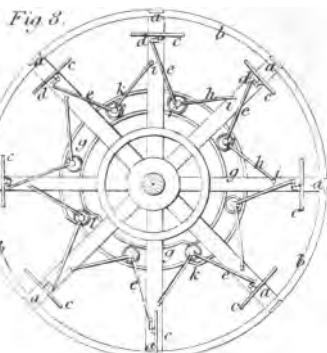
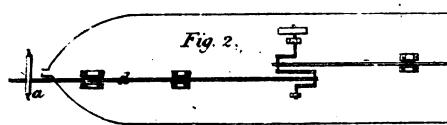
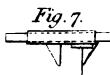
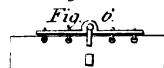
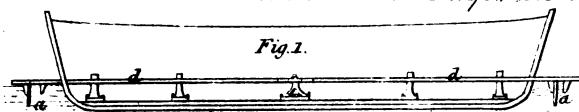
Fig. 19.



Jacquier's Paper Making Machine

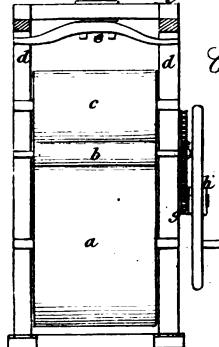
Fig. 20.



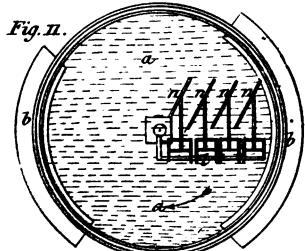
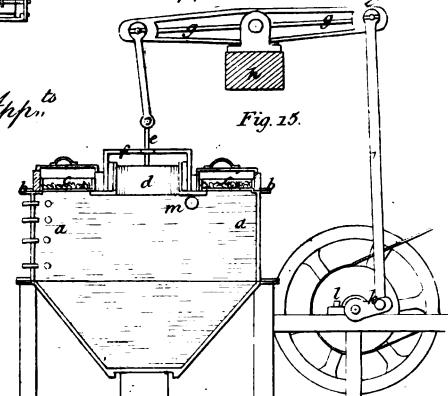
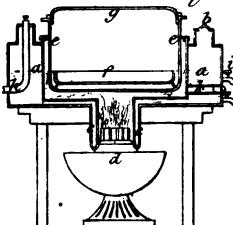
Sunderlands Imp<sup>o</sup> in Propelling

Pethericks App<sup>o</sup> For Washing C'rs

Hulie's Mangle



Cochrane's Crooking App<sup>o</sup>



Jumps Salt Pans

